The Electrical Industry's Weekly Magazine November 2, 1959

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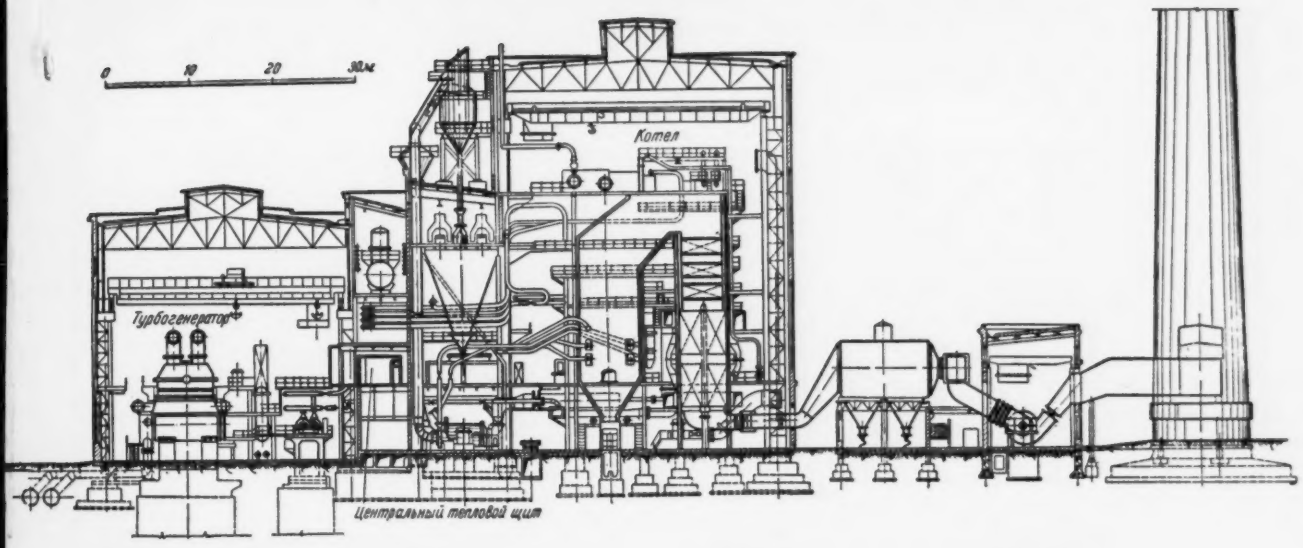
A McGraw-Hill Publication



Philip Sporn Sizes Up Soviet 7-Year Power Program

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Good Lighting Cuts Crime . . . page 50

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ADVERTISEMENT

General Electric's
J. W. Seaman, General Manager,
Power Transformer Department,
answers some questions on . . .

• New concepts in the power transformer business
• Benefits for utilities

Q. ***Mr. Seaman, what is General Electric doing to make progress in power transformers pay off for utilities?***

A. Quite a bit. Right now we are announcing an important extension of our Preferred Design transformer line that will bring many outstanding benefits to electric utilities.

Q. ***What are the major features of this new G-E PD Transformer Program?***

A. Actually, they begin with a new way of doing business . . . and a new approach to developing and producing power transformers. Let me explain. For some years now, our greatest challenge has been to find a solution to the seemingly always-rising labor and material costs. A partial solution to this problem was effected in 1957 when Preferred Design transformers were introduced. Using a 705 computer, we made an embryo attempt to introduce product uniformities into units rated up to 50 mva and 138 kv. With this start, techniques of more mechanization, sub-assembly work, and repetitive operations were utilized.

Now, we go a step further. Inflationary trends, still with us, dictated the need for further efforts—a new business approach.

Q. ***How would you explain General Electric's new business approach on power transformers?***

A. Simply this. General Electric has extensive engineering and manufacturing skill. However, because of the tradition of making custom-built or individually tailored transformers, our major advances have largely been limited to engineering accomplishments. Our new goal was to develop a concept whereby our latent manufacturing abilities could be applied to power transformers.

To do this, we have extended our Preferred Design program to include units rated as high as 250,000 kva and 230 kv. We have developed three styles of transformers for the three major application areas, i.e., large substation, transmission-tie and generator step-up units.

The uniform mechanical features and accessories for each type are truly utility-preferred because of our extensive product planning efforts to determine what the *industry* wanted. With these uniformities in our products, we are able for the first time to apply G.E.'s full manufacturing knowledge to power transformers. And, because of our computer, we are still able to offer complete electrical design flexibility to best meet specific requirements within each application area.

Q. ***How about those utility benefits?***

A. G-E power transformer users will benefit because our new concept has to, and does 1) combat the inflationary trend and protect or improve purchasing power, 2) reflect customer-preferred features and practices, and 3) simplify our product.

Q. ***Can you give some examples of that "product simplification"?***

A. Obviously, the uniform mechanical features and accessories are one example. Another is that for years we built different tanks, depending upon cooling method required. We have now relegated cooling to its proper place as an accessory where it does not interfere with our basic attempt to get optimum transformation. Cooling packages are now always placed at the end of the new tank which is suitable for all types of coolers. It isn't until the cooling equipment is to be attached that our assembly people must know which cooling method is specified.

The advantages of building essentially one type of tank are, I believe, readily apparent.

Q. ***What are the "pay-offs"?***

A. In the short range, operating people will see many new and better items in power transformers, such as ease in uprating, better coolers, easier installation, 40 percent faster deliveries, and others. Utility engineering people will be aided because our PD program permits valuable data on large units to be published for estimating and planning purposes. And, we can also supply, with our propositions, drawings that are approved for construction purposes—final planning or substation designs can begin immediately after an order is placed for a G-E unit.

Purchasing people will, I am sure, appreciate the addition of many features which formerly had to be specified. Now standard, these save dollars and some detailing work. Also, our progress to date in the areas just described permits us to realign net published prices which, averaging the few increases with the many decreases, will mean an over 5% downward adjustment for the entire line.

To utility management people particularly, we further state that this program should permit us to make effective manufacturing economies. If the utility industry then provides volume support and if inflation continues at the current rate, net published prices which haven't been increased since mid-1957 should remain near their present levels for at least the next several years.

Q. ***This sounds like every utility man connected with the purchase or use of power transformers could profitably explore these advantages. How about further information?***

A. Our General Electric Sales Engineers have full information. They, or the local G-E Apparatus Sales Offices, should be contacted. 301-404

More Power to America

GENERAL ELECTRIC

Electrical World

Vol. 152, No. 18 NOVEMBER 2, 1959

Published for 85 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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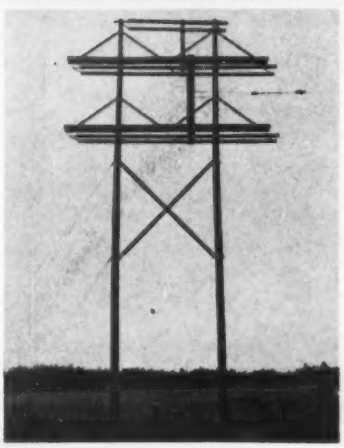

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Philip Sporn, American Electric Power Co

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Think of the time that can be saved with this all-new "Pole-Master." Its scope of operation—*to each side as well as to the rear*—completely eliminates the necessity of positioning the truck precisely for each job. In alleys and narrow streets, the PM-30 handles work in cramped space which would present a job-delaying problem to crews using a conventional single-arc derrick.

Line trucks equipped with the PM-30 can be parked parallel to the curb in congested areas . . . to dig a hole and set a pole without blocking traffic. Derrick movement, controlled by levers at rear of body, extends vertically from stowed position to within 18″ of the ground. The *new time-saving dimension of operation* extends 180 degrees horizontally . . . from one side of body to the other, with derrick at any angle of elevation. The PM-30 body-loads with ease. It furnishes low reach and ample down pressure for most efficient use of the Series DF-1 "Earth-Master" Hydraulic Digger shown, which digs up to 20″ in diameter and 10′ in depth.

For even greater versatility, the PM-30-55 "Pole-Master" is equipped with a head sheave which extends 56″ hydraulically. Maximum derrick height is 26′—easily handles 55′ poles. The PM-30-40, with fixed head sheave, has a maximum height of 21′ 6″ and is designed to handle 40′ poles. Underfloor winch line travel is optional.

Make it a point to get the complete story on the work-speeding PM-30 without delay. Details are yours for the asking.

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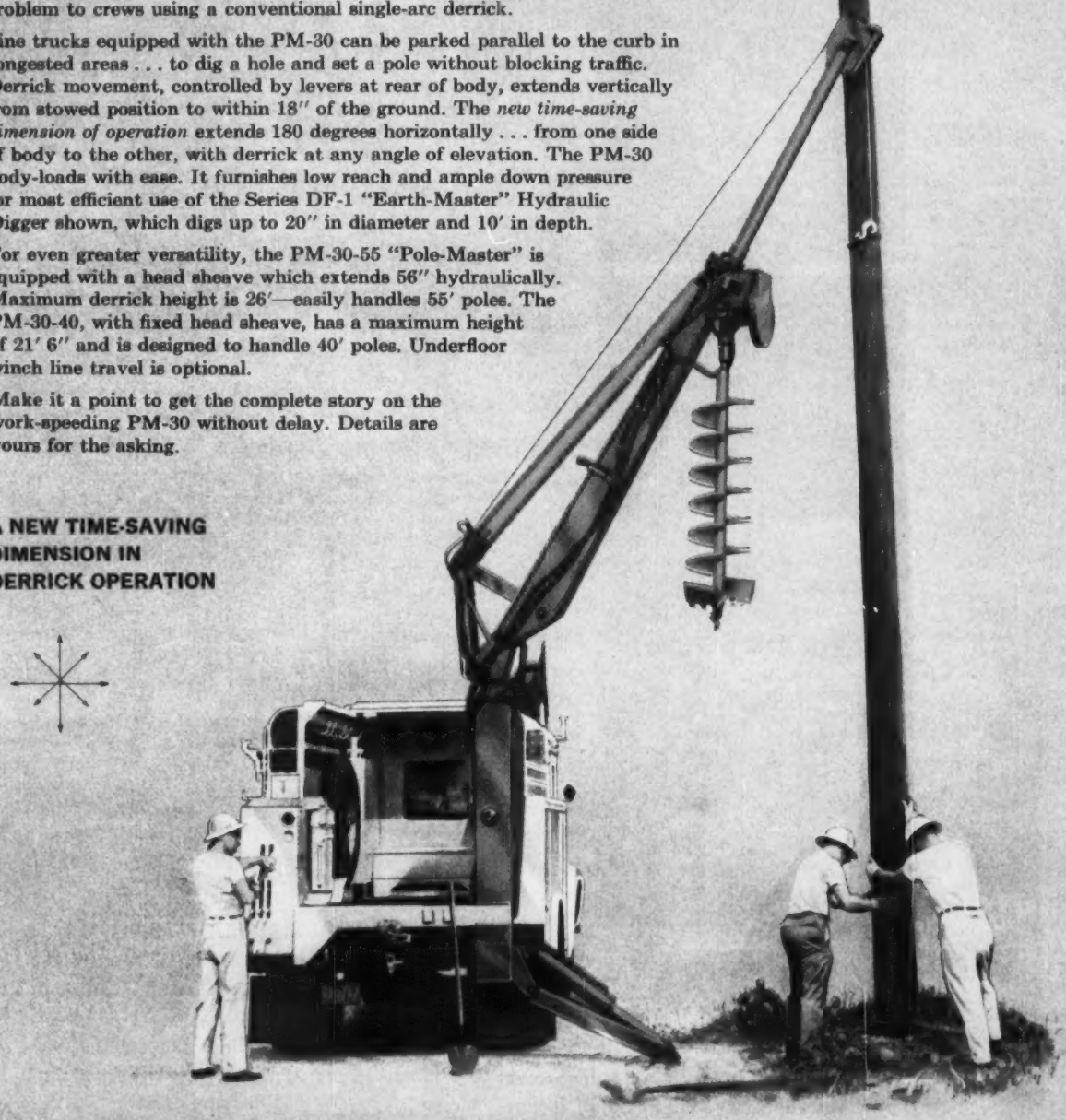

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LETTERS

Questions on Steam Station Report

To the Editor:

The Eleventh Steam Station Cost Survey in your Oct. 5 issue is up to your usual high standard, and we are going to find it immediately useful for a study that we are making for a government agency.

However, its usefulness would be greatly enhanced if we could tie its station numbers (332, 333, etc.) to the station identifications of your Fifth Steam Station Check Chart. Our problem is that we want to relate the cost to geographical location, extent of outdoor construction and other factors.

Can you make available to us an identification of the stations in your Cost Survey? We should appreciate it very much.

If you have reprints of your Cost Survey available, we should appreciate receiving one.

J. C. Hitt
Chief Electrical Engineer
Jackson & Moreland, Inc.
600 Park Square Building
Boston 16, Mass.

To Mr. Hitt and others who have written us asking for identification of the stations in the Cost Survey, we must reply that this is held in strict confidence. The information is obtained with the understanding that identity of stations and companies will not be disclosed.

Because data is gathered independently from different sources, and a 12-month period intervenes between them, the Steam Station Cost Survey and the Steam Station Design Report cannot be correlated on a station-by-station basis.

However, we are seriously considering identifying outdoor or semi-outdoor stations as to type in future Surveys.

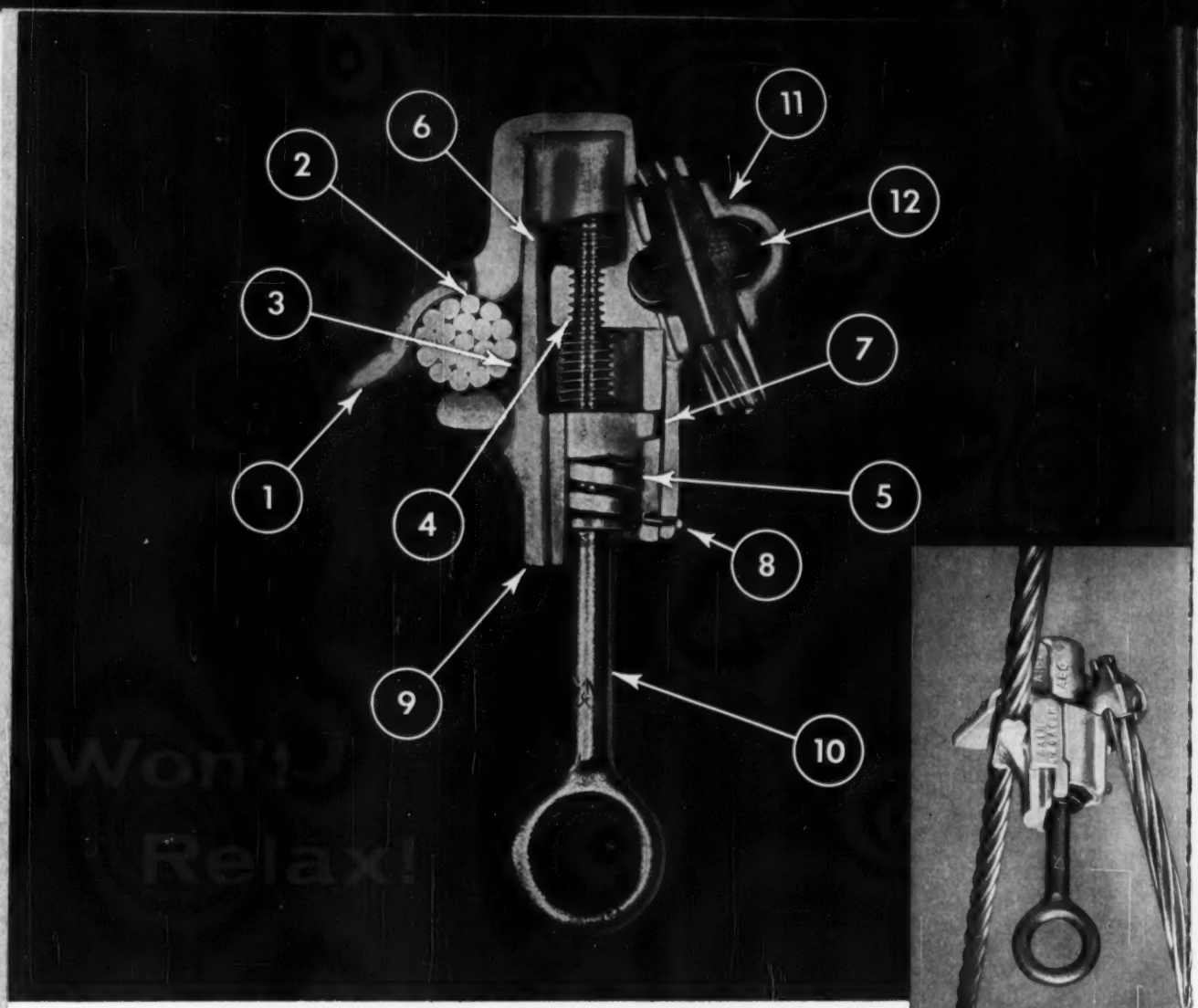
As to your last question, the answer is "yes." Reprints are available at 25¢ each.

To the Editor:

With reference to your Steam Station Costs Survey report (EW, Oct. 5, p 71), I will appreciate it if you will advise whether the figures given for operating and maintenance employees are "per shift" or for all three shifts.

J. B. Silverman
Consulting Engineer
4649 Cliff Ave.
Louisville 15, Ky.

Figures for operating and maintenance employees are totals—for all three shifts.



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Check the 12 features (shown above in cutaway view) of Anderson's new AH (aluminum) and BH (bronze) Dura-TAP hot line clamps. They're 12 sound reasons why you should specify these "won't relax" clamps for your next installation.

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11. **Eyebolt housing is part of main casting for minimum resistance.**
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- Step up manhour efficiency
- Simplify bookkeeping

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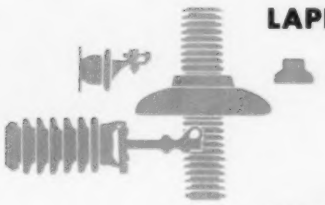

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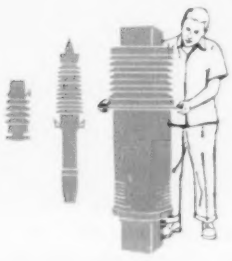

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"Since there was an average of 8 cables per foot of ladder, the installation cost per cable foot was roughly 20% of the installation cost per cable foot in 2″ conduit. Remember that each conduit supports only one cable—each cable ladder an average of eight.

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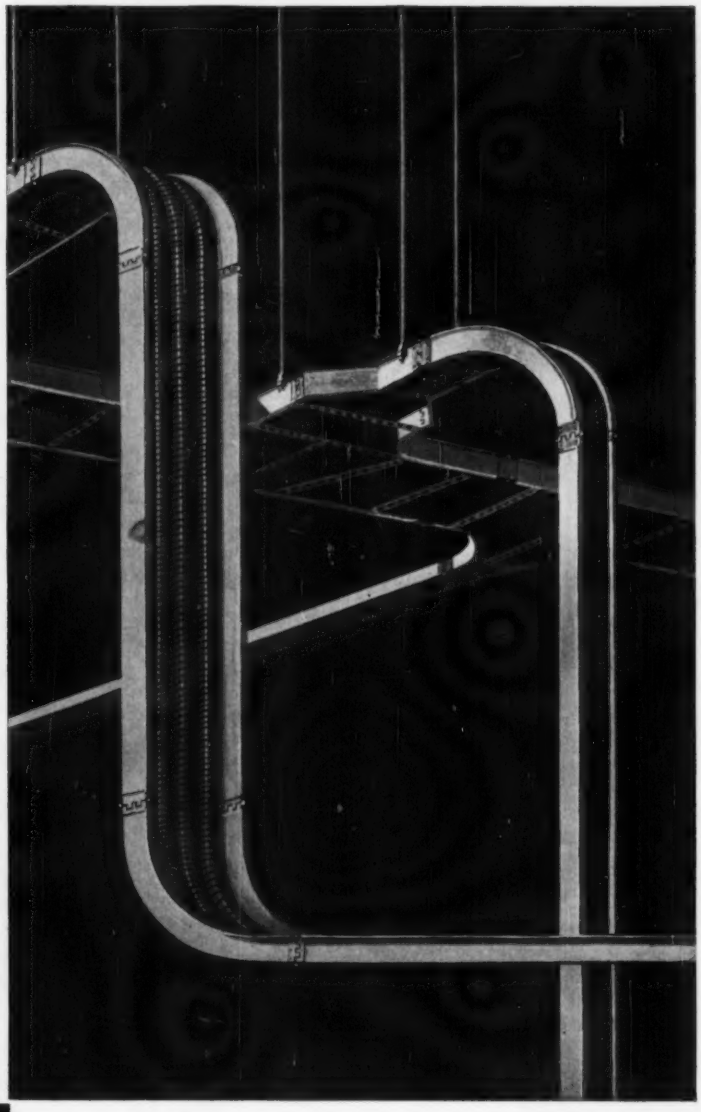

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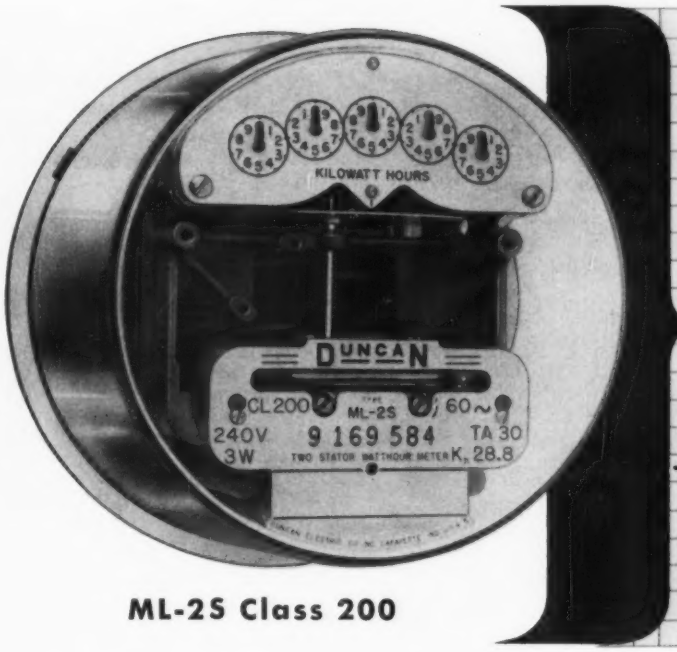

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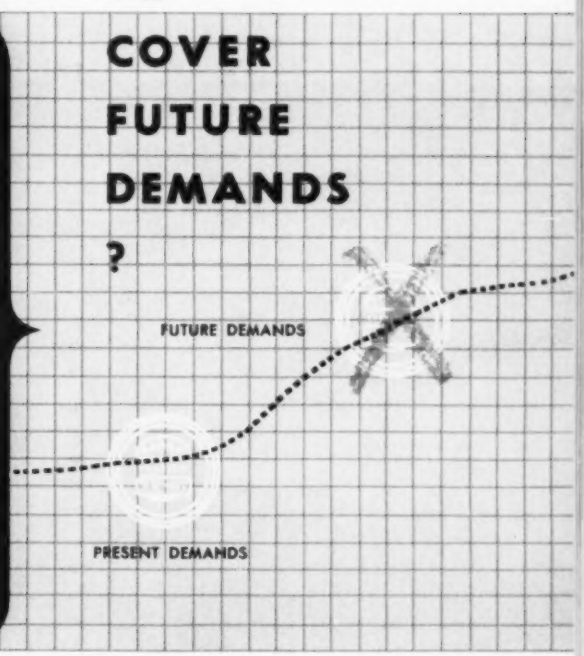

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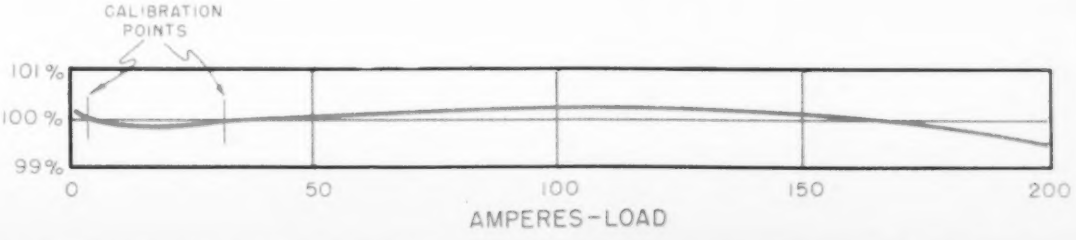

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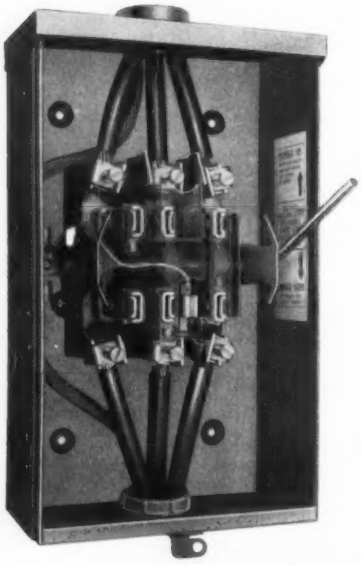

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The Electrical Week

LATE NEWS ▶ **FPC amends 1958 accounting order** spelling out requirements for utilities for federal income tax deferrals. Under new clarification, deferrals are permitted only (1) When state commissions authorize it, and file evidence with FPC; and (2) By utilities not subject to state regulation when proposed accounting plan is filed with FPC.

Westinghouse splits stock as 3rd-quarter earnings hit record. Earnings for first nine months are $3.17 a common share vs $2.79 for similar '58 period. Board will recommend 2 for 1 stock split to January stockholders' meeting. 3rd quarter dividend is 60¢ a share, up 10¢ over previous quarter.

House Government Operations Committee postpones hearings on contract between Montana Power and National Park Service until next year.

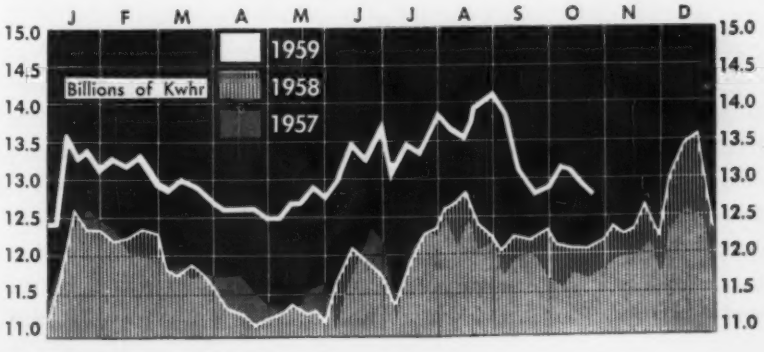
Date change . . . Second National Youth Conference on the Atom is changed to Oct. 20-21, 1960.

Change in reclamation feasibility formula may be result of Reclamation Commissioner Floyd Dominy telling National Reclamation Assn that old formula "must be examined," and "ways and means" must be found "for all beneficiaries to bear their fair share of the cost of a project."

Ringgold and Chickamauga, Ga., plan to get TVA power by letting one utilities board serve both cities. Officials claim new $\frac{1}{2}$-million system could cut rates 30%. Georgia Power declines to sell its facilities in either city.

Management changes . . . Black Hill P&L promotes H. E. Norman to senior vp and treasurer . . . Anaconda Wire & Cable elects R. B. Steinmetz president, succeeding W. E. Sprackling, who is retiring.

WEEKLY POWER OUTPUT—Up 4.8% (Week ending Oct. 24), Kwhr 12,762,000,000



Per Cent Change From Previous Year

	Oct. 10	Oct. 17	Oct. 24
Total U. S.	+ 8.4	+ 6.7	+ 4.8
New Eng.	+ 5.4	+ 4.8	+ 3.7
Mid. Atlan.	+13.1	+ 6.2	+ 4.9
Cent. Ind.	+ 6.1	+ 5.4	+ 4.0
West. Cent.	+ 5.0	+ 5.9	+ 4.5
Southeast	+ 8.3	+ 6.5	+ 5.1
South Cent.	+15.0	+14.9	+ 4.4
Rocky Mount.	+ 2.5	+ 1.9	+ 1.4
Pacific			
NW	+ 9.6	+ 8.9	+ 5.2
SW	+ 6.8	+ 6.6	+ 9.1

Seasonally Adjusted Index 248.3

Week Ago 251.5 Year Ago 236.6

Source: Edison Electric Institute

Preview of this Issue

EVENTS ▶ **Almost everyone agrees good street lighting cuts crime.** Statistical evidence to back the premise, however, is meager, albeit growing. New York City's 55% decrease in crimes of personal violence in relighted test areas is most recent undertaking, and one that can add to arguments for modernization **(p 50)** . . . New Mexico newspaper editor, R. M. McKinney, is named to head study of America's international atomic energy programs **(p 54)** . . . Power cost at dual Passamaquoddy tidal project would be 8.4 mills per kwhr for U. S. **(p 54)** . . . Priest Rapids Dam produces first commercial power **(p 55)** . . . OVEC load study aided by computer **(p 56).**

ENGINEERING ▶ **AEP Pres Philip Sporn sizes up Russia's 1959-65 power program,** sees it relies heavily on fossil fuels, while de-emphasizing hydro and making only limited use of the atom. It calls for generation up to 520 billion kwhr—2.2 times the 1958 level—with thermal capacity increasing 2.4-fold. Sporn cites statements of the USSR Minister of Power Stations **(p 57)** . . . Full-scale tests prove and indicate improvements on Orlando Utilities Commission H-frame design **(p 62)** . . . Wisconsin Utilities Assn, meeting at Milwaukee, urges the industry to sell its ideas harder. Speakers discuss electric heating, aluminum substations, and pre-strike theory of lightning **(p 79).**

Politics and Public Power

MOUNTAIN SHEEP: ANOTHER BATTLE?

The Federal Power Commission last week hoisted the "highball" sign starting Pacific Northwest Power Co's "High Mountain Sheep" license application down the tracks on a trip that is going to be rough, to say the least.

The commission, in accepting the application, set a Dec. 4 deadline for filings by intervenors. Hearings may start in January.

Actually, PNP's plans to develop the "Middle Snake" have already travelled a long, rough road to reach their present point. But the next leg promises to produce one of the most bitter fights yet on record for a hydroelectric license application—even as great as the Hells Canyon high dam fight at the commission and in Congress.

In addition to renewed opposition from public and federal power advocates, the Mountain Sheep case could easily result in an unusual intra-government fight—between the Interior Dept and the Army Corps of Engineers.

The Engineers have recommended a High Mountain Sheep dam, and this could well be the firm foundation on which PNP will be able to win approval of its license application. PNP relied heavily on the Engineers recommendations for such a dam, and in fact, although the company first filed a partial application to build a single high Mountain Sheep dam in April, 1958, it waited more than a year afterward to complete its application—in order to incorporate the Army's specific proposals.

Interior, however, maintains that any dam on the order of PNP's proposed high dam (690 ft) should not be built at this time on the Middle Snake, where migratory fish are

PROCUREMENT & PRODUCTS ▶ **Utility fleet buyers give compact cars the eye** . . . Chase-Manhattan Bank says there could be an East Coast residual oil shortage this winter . . . High aluminum output related to strike fears? **(p 84).**

MANUFACTURERS ▶ **Ground broken for new Westinghouse power transformer plant** . . . Second annual session of National Conference on the Application of Electrical Insulation set for Dec. 7-11 at Shoreham Hotel, Washington, D.C. **(p 90).**

NEW EQUIPMENT ▶ **Unit substation transformer has dual secondaries** . . . Open dropout cutout has a solid blade and serves as a disconnect switch . . . Substation frame for PR closer is now available **(p 100).**

MANAGEMENT ▶ **How can the younger engineer get ahead?** What he does with the first five years of his career makes a big difference, according to the Engineers' Council for Professional Development. Read about how the Council encourages graduates toward professional stature, and how electric utilities fit into the picture on **page 119.**

SELLING ▶ **Renovated Chicago apartment house goes all-electric** to the tune of 400 kw . . . AHLI director sees big potential in home lighting **(p 110).**

running, because adequate fish ladders and facilities haven't been developed for such projects. The High Mountain Sheep cuts across salmon runs, not only on the Snake, but also to a lesser degree up the Imnaha, which flows into the Snake above the dam site.

Interior has requested that a high dam be built farther upstream on the Snake at the Pleasant Valley site, where fish runs are smaller and where Idaho Power Co's dams in Hells Canyon are under construction.

PNP was born in 1954, and is owned by Portland General Electric Co, Washington Water Power Co, Montana Power Co, and Pacific Power & Light Co. It was created to own and operate a $234-million two-dam development on the Snake—low dams at Mountain Sheep and Pleasant Valley—to produce 1,446,000 kw. (The present plan would cost $178 million, generate a maximum of 2 million kw.).

The two-dam application was turned down by the FPC in '57 because it did not include, and automatically ruled out, a dam at the Nez Perce site, farther down the Snake near the confluence of the Salmon River.

All this time, PNP withstood withering propaganda blasts by Northwest Public Power Assn and others, who maintained that an alternate federal dam should be built at Nez Perce. PNP's proposal had won the support of FPC Examiner Edwin B. Marsh, who found the project best suited to the comprehensive development of the Snake.

The Commission's 1957 ruling apparently stuck in PNP's craw, because the new single-dam proposal points out that a High Mountain Sheep dam, plus eventual building of a lower canyon dam on the Salmon, would together produce more power, and impound more water than Nez Perce.

Executive Reader

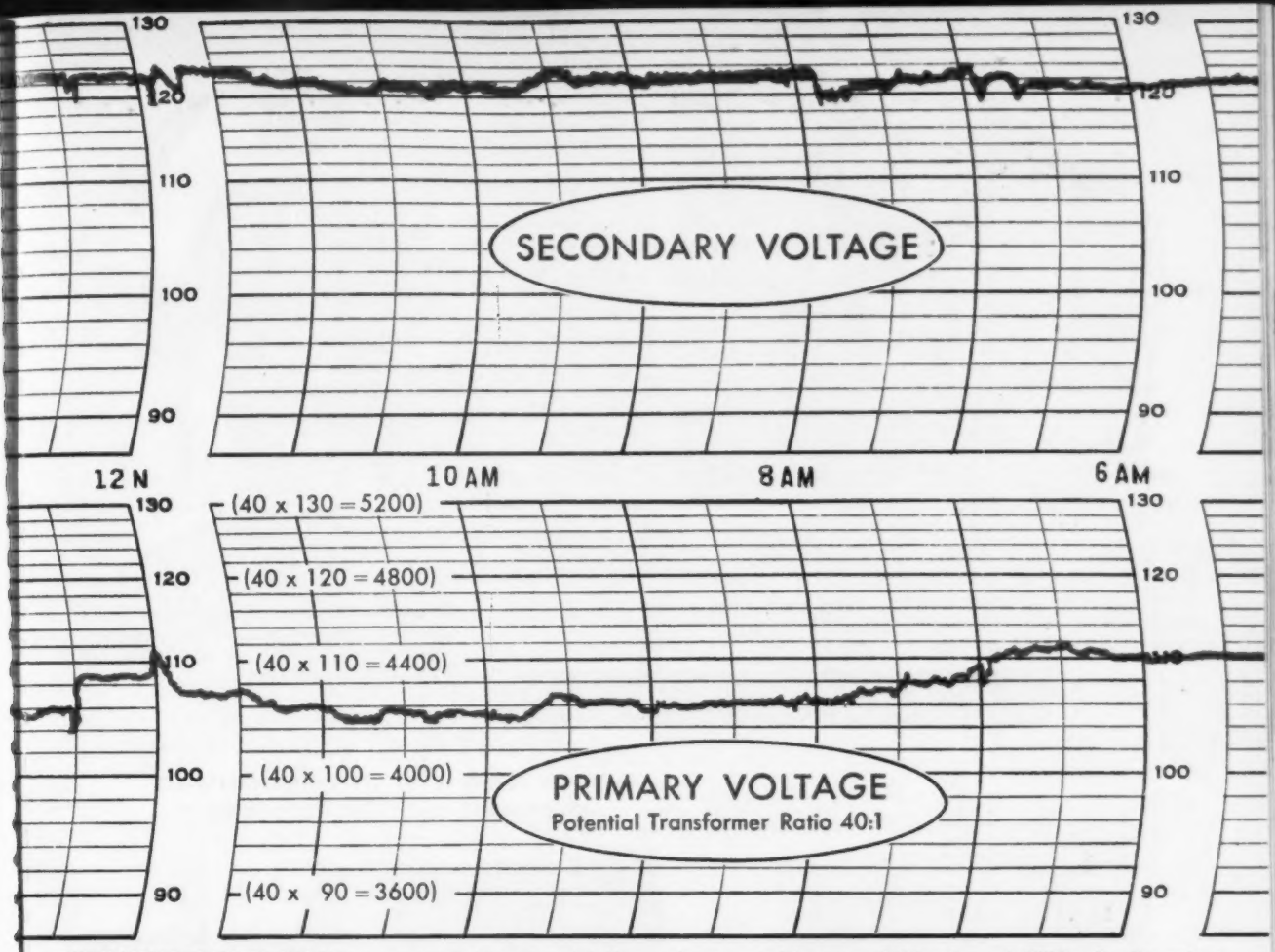
A 40% reduction in the time needed to turn out large power transformers has been gained through use of computers to design equipment by General Electric Co. Power transformers are available in three basic shapes without a sacrifice in the range of electrical characteristics or accessory equipment (EW, Sept. 28, p 56-57). As manufacturing operations are modernized, a 20% cut in prices will be possible over the next four years if 70% of the industry accepts the standardization concept. Westinghouse Electric Corp, following the path of standardized components, is studying the automation of component assembly lines at a power transformer plant. Use of a computer to prepare engineering specifications and design dimensions for the production shop is being studied by Allis-Chalmers Mfg Co. **Business Week, Oct. 17, 1959.**

New numbering system plus many changes in substance are included in the 1959 edition of the National Electrical Code, which has been approved as American Standard Cl-1959 by American Standards Assn. The code is published by the National Fire Protection Assn, and is available in a pocket edition from the National Board of Fire Underwriters. **American Standards Assn, Dept PR, 100, 70 E. 45th St, New York 17, N. Y. Price $1.00.**

Uses for aluminum up to 30 million lb annually by 1965 may come from research into aluminum and cryogenics, the study of behavior of materials at temperatures close to absolute zero. One such use may be in refrigerators and air conditioners with no moving parts. **The Iron Age, Oct. 15, 1959.**

Largest load flow study ever undertaken will be made for the interconnected systems of the 15 electric companies that form the Ohio Valley Electric Corp (OVEC). A load flow program developed by engineers of American Electric Power Service Corp for the IBM 709 computer wil analyze power transmission networks of about 333 generators and transmission stations and 532 transmission lines. This system represents the entire OVEC interconnection network, its 15 sponsor companies, and their neighboring systems in eight states centering on Ohio. **Corporation for Economic & Industrial Research, Arlington, Va.**

Inexpensive perfume and a water pistol are "packed" by meter readers of Gulf States Utilities to discourage dogs. Use of perfume has been effective in quieting barking dogs as well as discouraging those that maliciously or inquisitively charge. Perfume appears to have no harmful effect on dogs.



THESE VOLTAGE METER CHARTS were recorded between 6 A.M. and 12 noon on an average work day. Although the primary voltage varied between 4160 volts and 4500 volts, the output voltage of the SRT remained between 120 and 124 volts.

L-M SRT® Provides Simple Solution For Regulation at Industrial Plant

Recognizing SRT as an engineering development and realizing its possibilities for future customer requirements, Cleveland Electric Illuminating Company installed a Line Material SRT (Self-Regulating Transformer) at the end of a primary feeder.

A 37½ kva load was supplied to an industrial plant by one of Cleveland Electric Illuminating Company's 4340 volt primary feeders. This plant was located on the last third of the feeder and was subjected to variations in primary voltage. As in all industrial loads, the demand factor further complicated the situation. This 3-wire, single-phase, 120/240 volt load had primary voltage variation between 4160 volts and 4500 volts during the working day.

Cleveland Electric Illuminating Company decided to try a test installation of a Line Material SRT. The Adapt-a-Tap range was selected to permit fully automatic control within a primary voltage band in excess of 8 percent. The midpoint was set at 121 volts with a band width of four volts.

After the SRT was installed, the metered secondary voltage of this industrial load remained within the band from a fraction of a volt less than 120 volts to a fraction of a volt more than 124 volts, while metered primary voltages varied between 4160 volts and 4500 volts.

Get Data on the SRT

Line Material's SRT can solve an unlimited number of regulation problems where the solution is most imperative *at the load.* For information on how the SRT can solve your regulation problems, contact your L-M Field Engineer; or write Line Material Industries, Milwaukee 1, Wisconsin.

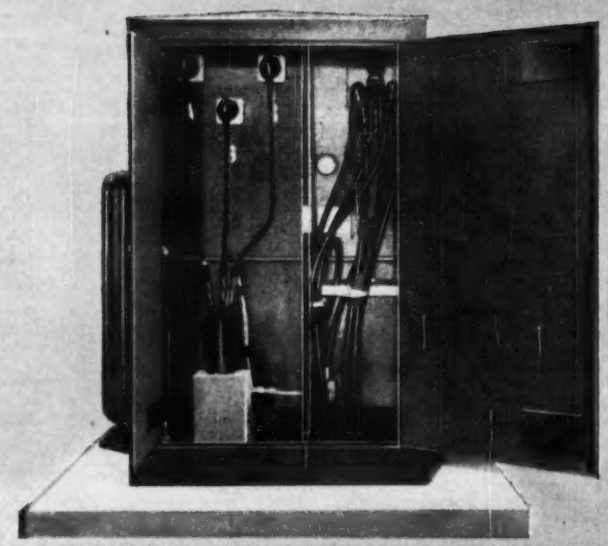
THIS 37½ KVA SRT was installed in a vault adjacent to the industrial plant. Secondary runs were short and voltage regulation with the SRT was improved.

LINE MATERIAL Industries
McGRAW-EDISON COMPANY
Distribution Transformers

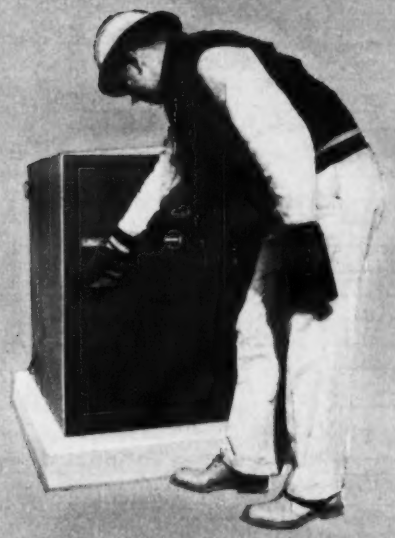
McGRAW-EDISON

This is L-M's Transformer Silver Anniversary

421

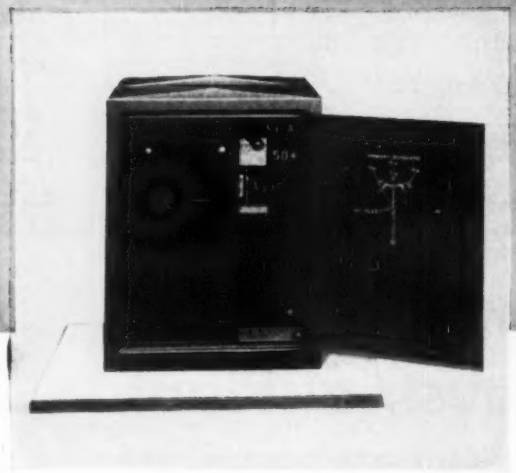


THIS 300 kva, 12,000 volt three-phase unit is installed at a small industrial plant. Note that the primary compartment at left can be closed for safety when work is being done on the secondary.



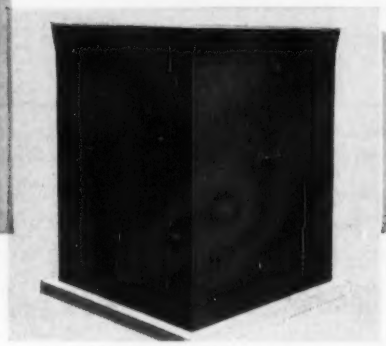
LINEMAN is about to close and lock door. Note the neat, compact appearance of the unit, which makes it ideal for residential subdivisions, where low shrubbery can hide the unit completely.

This is L-M's Transformer Silver Anniversary

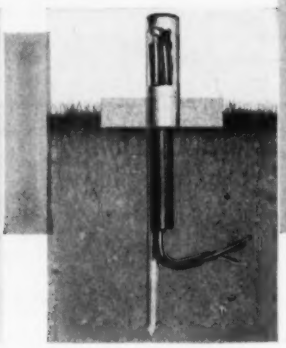


SINGLE PHASE 50 kva, 12,470 grounded Y/7200-volt L-M Pad-Mount Transformer. Primary compartment is closed, at left. At right is secondary compartment, with insulating barrier separating it from primary section.

OTHER NEW L-M UNDERGROUND DISTRIBUTION EQUIPMENT



L-M TRANSCLOSURE(TM), a convenient, multi-size, rainproof, ventilated steel housing for pole-type distribution transformers, protective equipment, reclosers, load transfer equipment, etc. Provides above-ground accessibility for underground services.



L-M POWER PEDESTAL, for above-ground connections of buried secondary services. Removable dome; raintight; tamperproof, with provision for padlock. Ask L-M Field Engineer or write for bulletin on styles available.

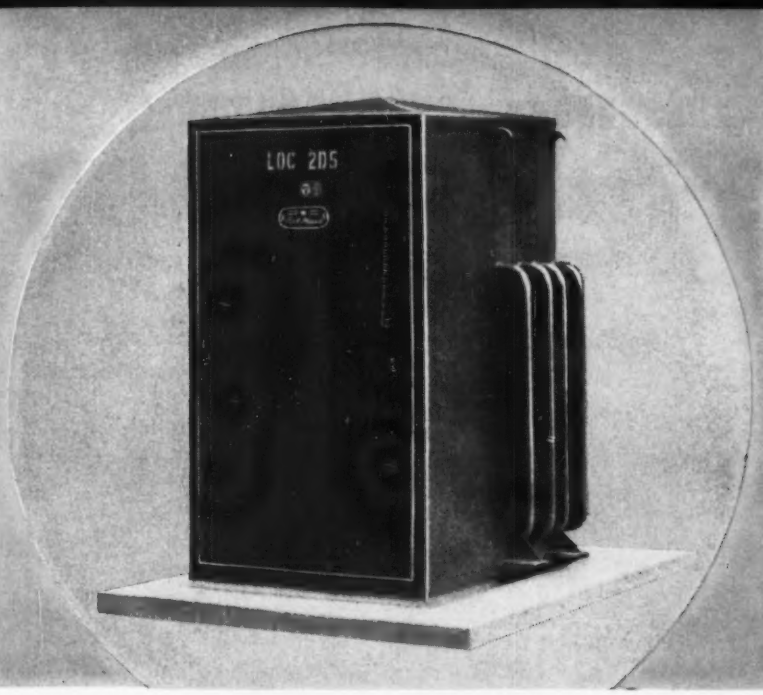
THIS TRUCKLOAD of L-M Pad-Mount Transformers is part of a 68-unit order being installed at a large trailer court in the Middle West. Quantity production and delivery like this have enabled L-M to make drastic reductions in the cost of this specialized, highly efficient transformer.

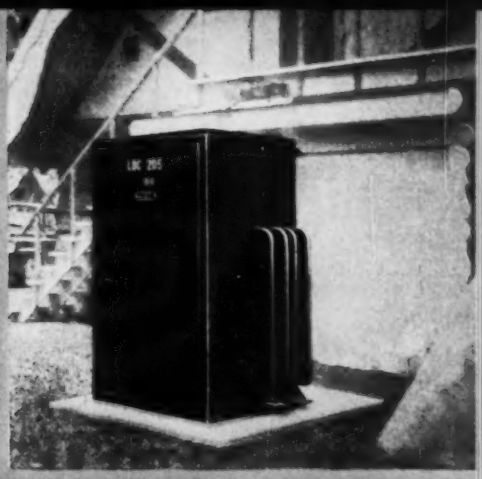
406

Nothing Else Like It!

The L-M Pad-Mount Transformer is available in single-phase through 167 kva, and three-phase through 500 kva in all distribution voltages.

Get complete information on how the LM Pad-Mount Transformer will help you simplify *your* underground construction problems. Ask the L-M Field Engineer for Bulletin DT8. Or write me at Line Material Industries, Milwaukee 1, Wisconsin.





L-M 225 kva three-phase Pad-Mount transformer provides underground service for Santa's Village, a "kiddie park" near Dundee, Illinois. Note that welded panels between cooling tubes and tank prevent attaching guys and ropes. This identical cabinet also accommodates a 500 kva Pad-Mount transformer for future load growth.

New L-M Pad-Mount Transformers Are Practical For Underground Distribution

Developed by L-M in cooperation with engineers of major utilities to meet specific requirements for underground distribution systems. Provide advantages not available in other types.

By **A. R. WAEHNER**
Director of Transformer Sales
Line Material Industries

Economical underground distribution is a vital topic of study and discussion today by leading system-planning engineers. Recognizing the future developments, load-growth opportunities, and other factors placing pressure on utilities, Line Material has cooperated with utilities to develop equipment that will help make underground distribution simpler, more efficient, and more economical to install and maintain.

L-M's Outstanding Development . . . One of the leading developments from this extensive cooperative research is the Line Material Pad-Mount Transformer. This outstanding unit has already been thoroughly tested. It is used by a number of utilities, including one of the largest in the country, where it has been in operation for about two years. It is proving highly successful, primarily because the design has been progressively developed to take full advantage of the opportunities afforded by newer, simpler methods of underground construction.

Conventional or Self-Protected . . . The L-M Pad-Mount Transformer is of Round-Wound® design, available in either conventional or self-protected, in single- or three-phase, in a tank specially designed for ground-level or roof-top mounting. A locked door covers the primary and secondary bushings. It can be completely hot-stick operated. There is an oil switch in the primary. A stand-off insulator for primary leads, mounted in the cabinet but not on the transformer, permits taking the transformer out of service when desired.

Compartmental Design . . . The compartments are so arranged that the primary section is completely isolated with a barrier of insulating material. This prevents access to the primary when working the secondary side. Door has rust-proof stainless-steel piano hinge.

No De-Rating with This Unit . . . The de-rating conventionally applied to transformers in buried or semi-buried vaults is not necessary, because the L-M Pad-Mount is a free-standing, above-ground unit, which takes full advantage of air circulation.

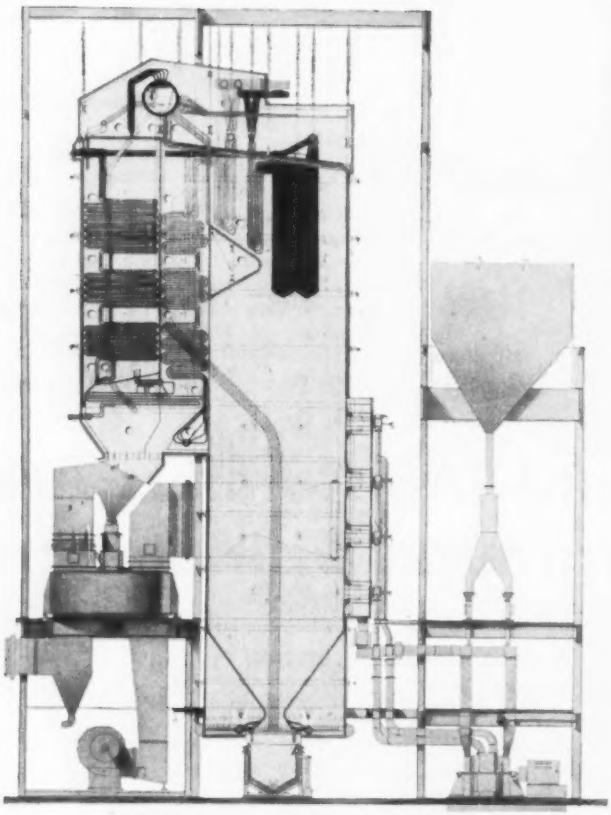
Volume Results in Cost Reduction . . . The original cost of this highly specialized, highly efficient unit apparently would be much more than even the most refined of the buried devices. However, volume production has enabled L-M to make drastic cost reductions. The L-M Pad-Mount is an extremely economical unit to buy and install in comparison with other systems.

Easy to Install . . . Installation is extremely simple. All that is needed is a concrete pad, with primary and secondary services brought up through fibre conduit. The bushings are so located that no sharp bends are made in the cable, thus assuring full life for the cable.

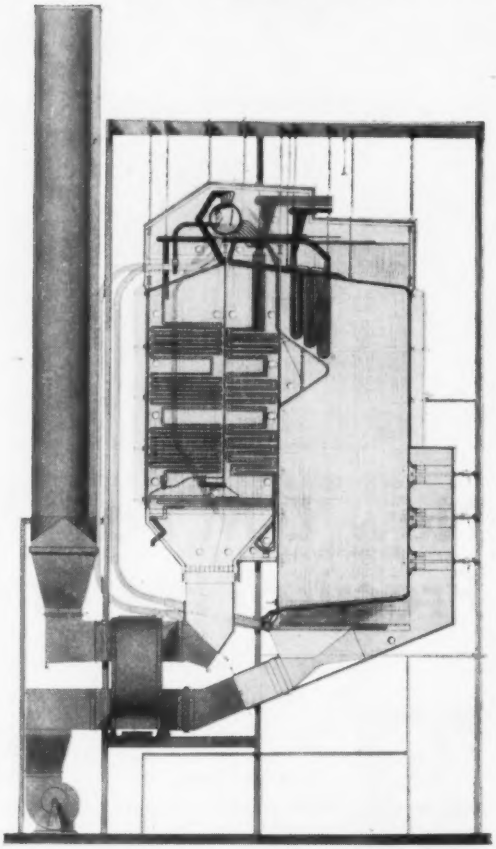
The cabinet may be separately shipped, mounted, and wired when underground services are installed in a subdivision. The transformer may be shipped later and easily attached to the compartment with four bolts.

LINE MATERIAL® Industries
McGRAW-EDISON COMPANY
Underground Distribution Equipment

Are You Planning To Burn COAL? OIL or GAS?



950,000 lbs./hr., 1950 psig, 1000/1000F;
Fired By Riley Pulverizers, Flare Type Burners



1,020,000 lbs./hr., 1925 psig, 1005/1005F;
Fired By Gas, Oil — Pressurized Furnace

Riley Custom Boiler Engineering, Know-How In Combustion Can Give You Top Performance Regardless Of The

Riley Boilers Equipped With Complete Riley Fuel Burning Systems

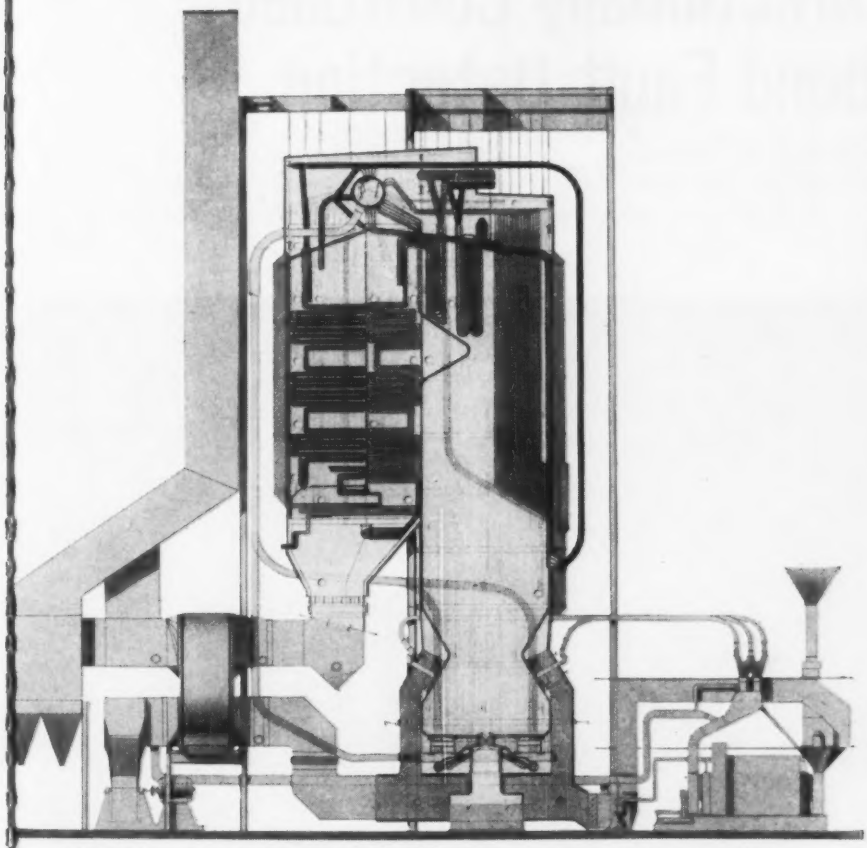
For pulverizing coal Riley offers two types of mills: the Riley Pulverizer and the Riley Ball Mill. These are used with either horizontal Riley Flare Type Gas/Oil/ Coal Burners, or with Riley multiple fuel Directional Flame Burners in Turbo Furnaces. A Riley Boiler installation complete with Riley fuel burning equipment assures Riley's undivided responsibility.

Turbo Furnace Boilers Designed Especially For Multiple Fuels

The Riley Turbo Furnace is ideally suited to firing multiple fuels. When firing coal furnace remains slag-free, flyash disposal is eliminated, carbon loss is negligible. Flame characteristics of gas, oil and coal are similar, simplifying steam temperature control. Available with reheat, non-reheat, with pressurized and non-pressurized furnaces in all capacities and pressures.

A Survey Of Your Plant by A Qualified Consulting Engineer Can Show You Ways To Mak[illegible]

?or ALL THREE ?



1,600,000 lbs./hr., 2125 psig, 1005/1005F; Turbo Furnace with Riley Ball Mills; Pressurized Furnace. Fuels — Gas, Oil, Coal

SOME PUBLIC UTILITIES USING RILEY EQUIPMENT

Louisiana Power & Light Co. (3)
Texas Electric Service Co. (3)
Houston Lighting & Power Co. (13)
Dallas Power & Light Co. (3)
Kansas Gas & Electric Co.
Public Service Co. of Indiana, Inc. (12)
New Orleans Public Service, Inc. (3)
The Holyoke Water Power Co.
Columbus & Southern Ohio Elec. Co.
Central Illinois Light Co. (8)
Hartford Electric Light Co.
Central Power & Light Co.
Monongahela Power Company
Arkansas Power & Light Co.
Southwestern Gas & Electric Co.
Utah Power & Light Co. (3)
Florida Power Corporation (2)
Delaware Power & Light Co.
Minnesota Power & Light Co. (2)
Pacific Gas & Electric Co.
Iowa Public Service Co.
Commonwealth Edison Co.
Manila Electric Co.
Southern Nevada Power Co.
Interstate Power Co. (7)
Northern States Power Co.
Central Louisiana Elec. Co. (2)
Union Electric Co. of Ill. (2)
Northern Virginia Power Co.
Union Electric Co. of Mo. (7)
Pennsylvania Electric Co.
Iowa Electric Light & Power Co. (3)
Iowa-Illinois Gas & Electric Co. (7)
Montana-Dakota Utilities Co.
Mississippi Power Company
Philadelphia Electric Co. (4)
Central Ohio Light & Power Co. (6)
Gulf Power Co. (4)
Otter Tail Power Co. (5)
Public Service Elec. & Gas (N.J.) (7)
So. Carolina Elec. & Gas Co. (3)
Taiwan Power Company (2)

Numbers Indicate Repeat Orders

Techniques, Selectivity Of Fuel Burning Equipment Nature of Fuel, Load, and Steam Conditions

Riley Provides Skilled Construction Engineering Services

Riley Stoker Corporation supplies complete construction services. Riley construction crews employ the latest in construction methods and techniques.

Experienced Service Engineers Assist In Maintaining Safe, Efficient Operation Of Your Boiler

Riley Service Engineers are trained for prompt and efficient servicing of all Riley installations. These experienced engineers work closely with your operators.

Riley Stoker Corporation, having successfully met the challenge imposed by the remarkable growth of the public utilities in the past decade is thoroughly prepared to meet the even greater challenges to come.

You'll Find A Riley Office In Each Of These Principal Cities:

Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Jacksonville, Kansas City, Los Angeles, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Salt Lake City, San Francisco, Seattle, St. Louis, St. Paul, Syracuse, Worcester.

RILEY STOKER CORPORATION, WORCESTER, MASS.

RILEY

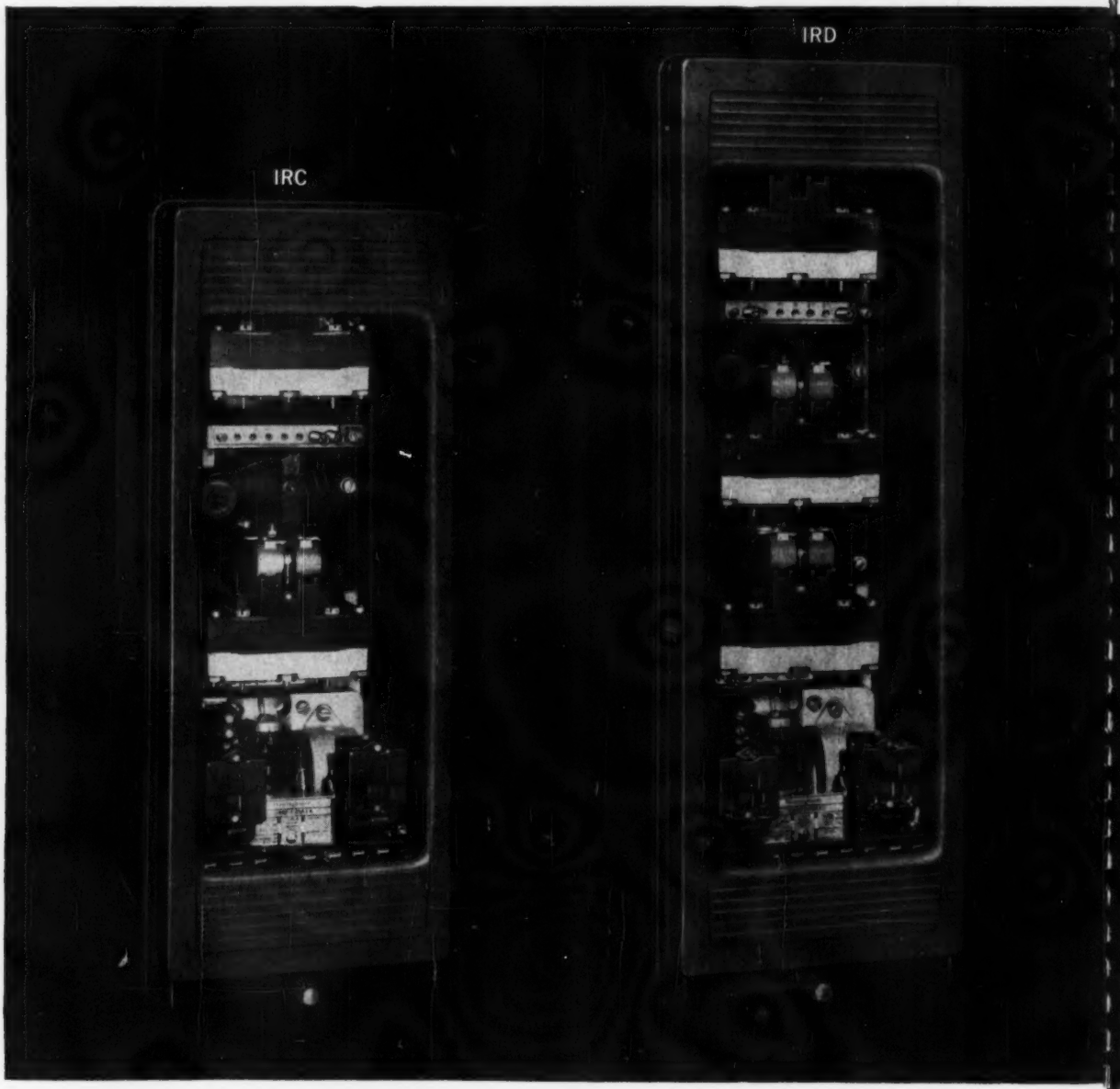
STEAM GENERATING & FUEL BURNING EQUIPMENT

Mak urprising Savings In Your Power Costs

New Westinghouse IR Relays Provide Directionally Controlled Ground Fault Detection

Westinghouse research has developed three new relays for transmission line ground fault detection:

Types IRC—current polarized, FT-31 case
IRD—dual polarized, FT-41 case
IRP—potential polarized, FT-31 case



Both the instantaneous and time-delay overcurrent units are torque-controlled by the directional unit.

Taps on the instantaneous unit facilitate setting and maintain a low burden level at any tap value over the entire current range. The cylinder unit design is insensitive to transients.

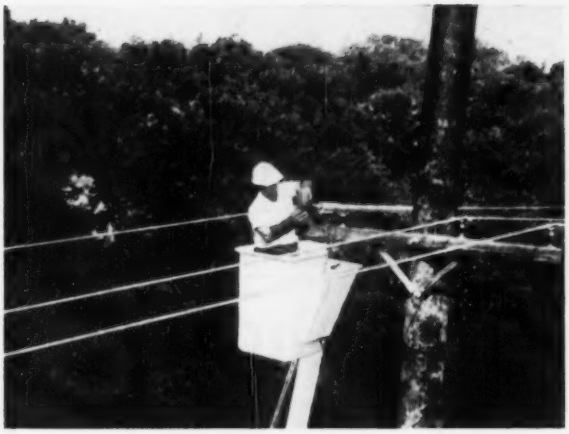
The time-delay overcurrent unit is available with any of seven different time-curve characteristics, plus a wide range of selectivity in time dial positions and minimum operating current.

For complete information on the new IR relays, call your Westinghouse salesman. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40523

YOU CAN BE SURE...IF IT'S

Westinghouse

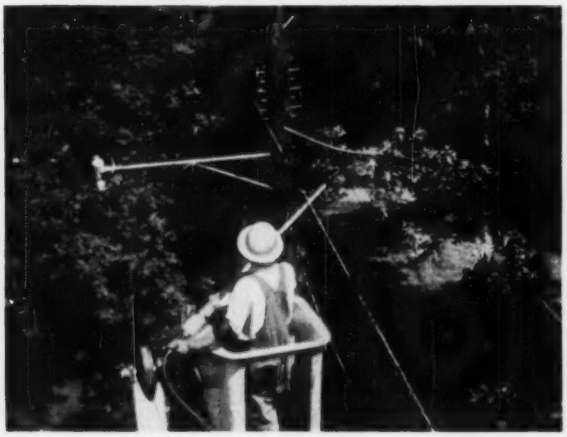
WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS



ELECTRICAL DISTRIBUTION LINEWORK

WORK REQUIRING TWO MEN ALOFT

STREET LIGHT MAINTENANCE



TREE TRIMMING

Now! Lease a SKYWORKER for one year at only $2.96 per hour...cut costs of these jobs by 50%!

Leading utilities have found this to be true: the hourly yield of crews equipped with SKYWORKER aerial lifts is twice as effective as crews equipped with conventional line trucks.

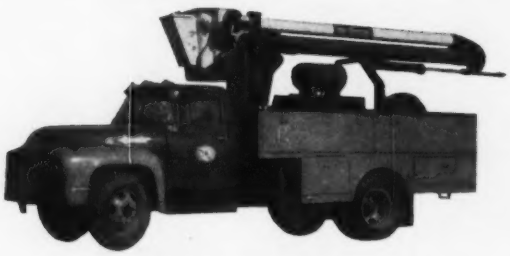
SKYWORKER utilizes men more efficiently. Aloft, men move from one work position to another with a touch of the controls. Crews move from job to job easily and quickly. With the fatigue of climbing eliminated, the talents and knowledge of experienced men beyond the climbing age can be used aloft for many more years.

Safety records climb along with efficiency records. SKYWORKER work platforms are insulated to a high dielectric strength. Power outlets at work platform provide speed in work plus additional safety for linemen by further reducing the fatigue factor.

All these factors combined yield a saving of nearly $17,000 a year for most SKYWORKERS in use!

And, now . . . these savings are available to every company through lease and lease-purchase, as well as purchase plans. You can now lease a SKYWORKER for one year at only $2.96 per hour.

Let us outline our lease plans to you and determine the savings SKYWORKER will make possible in your program. For prompt cost and technical information, write or phone us today. (Phone: Hartford, CHapel 9-0671)



SKYWORKER MODEL 1035B

New Skyworker Film available. Write . . .

EMHART MANUFACTURING COMPANY

SKYWORKER DIVISION

HARTFORD 1, CONNECTICUT

FUTURA CIS*

O-B Suspension Insulators

* CORROSION INTERCEPTING SLEEVE

...and it's built to stay stronger!

Futura insulators similar to the one shown above have served 15 years in locations where other insulators are failing in one to five years.

Thirty years ago, even in the locations referred to above, this type of corrosion failure was almost unheard of. And it wasn't until many years later that two of the major causes were revealed as atmospheric contamination and high voltage stress -- both of which were found to accelerate corrosion failure.

The point we'd like you to consider is this: how much more common will corrosion failure become as atmospheric contamination -- and voltages -- increase over the next 10 . . . 20 . . . 30 years?

Would you hazard a guess as to where and when you'll need this protection? Or would you rather *get it now, on every tower, at no extra cost?*

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4961-H

Behind this number
of VAREX®

Fixing responsibility for materials, methods is basic step to product improvement

Source, type and lot of
raw materials are readily identifiab
from records for each serial numbe

r lies the full story
quality control

A complete data processing record is kept on each Varex capacitor and keyed to the serial number. Give us the number and we can quickly tell you the source, type and lot of raw materials . . . the day it was made . . . the people who made it . . . the log of evacuation procedure . . . the final factory test results.

Why is such a system important to you? It provides, first of all, a complete master check on each production detail, a basic step in any successful quality control program.

It fixes responsibility. Every supplier of material, every O-B employee knows that what he contributes to a Varex unit is a matter of record.

It also provides a sound, precise fund of knowledge for making product improvements in an orderly way. If we change a material or process, even slightly, we can pinpoint the effect immediately and evaluate the results during the factory testing program.

When it's necessary to correlate factory procedure with field performance, it's much easier when we have complete case histories on each capacitor.

At the moment we sincerely believe you're getting the best capacitor available when you buy Varex. But we know there is always room for improvement, in any product. That's why we're doing everything possible, and individual product identity is just one phase, to make sure these improvements come as fast as possible!

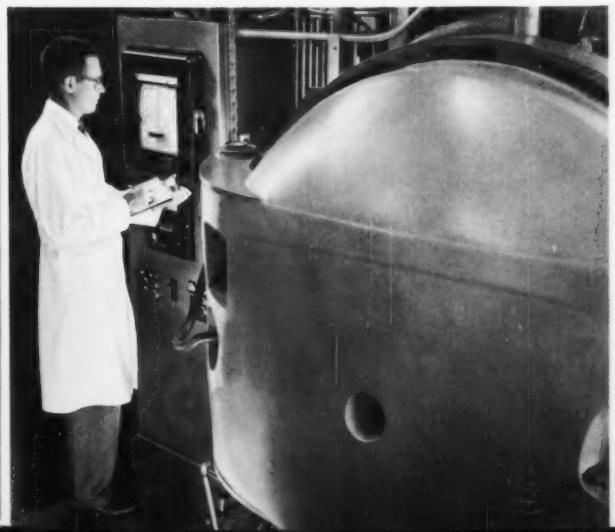
OHIO BRASS COMPANY, MANSFIELD, OHIO

4961-23H

Ohio Brass HOLAN

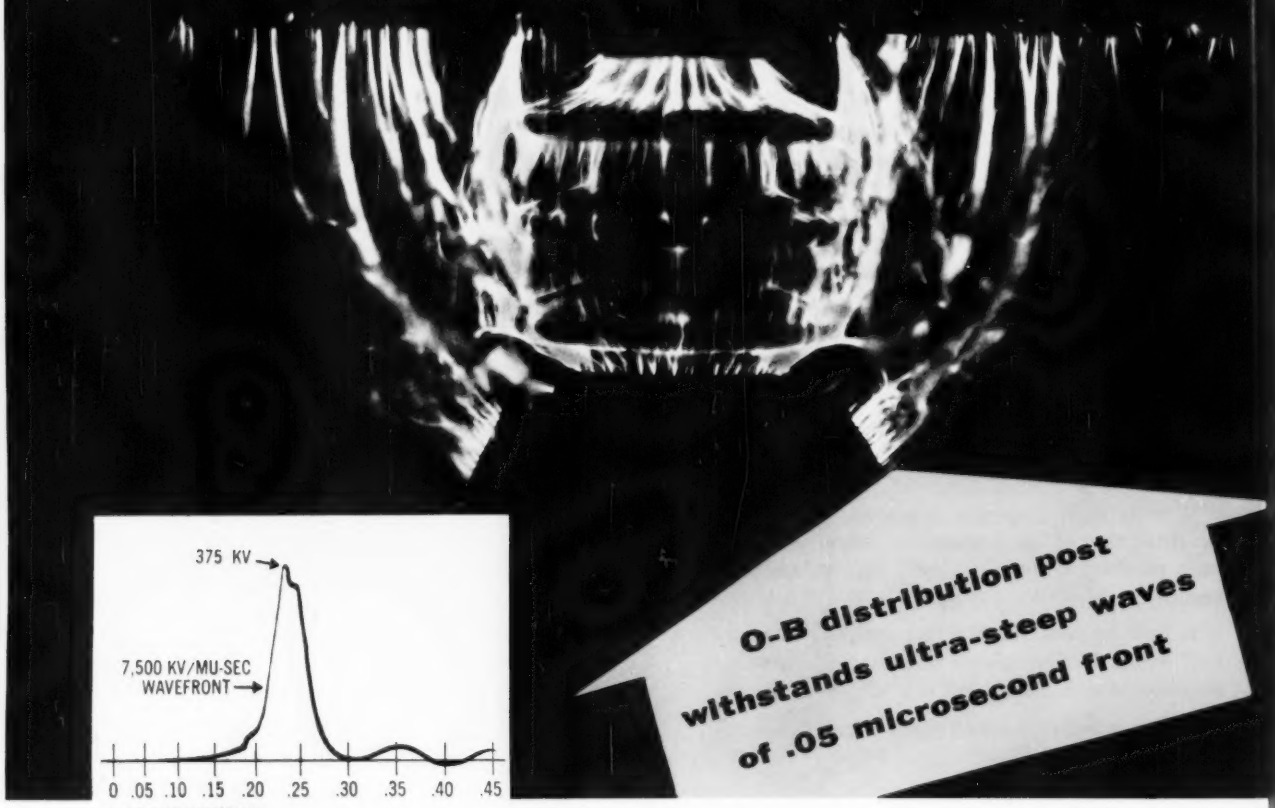
PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

Evacuation procedure is logged carefully; log becomes part of a permanent record.



Final electrical tests build fund of fundamental knowledge from which we can proceed to improve the product.

After this, lightning looks easy



Oscillogram of steep-wave flashover of O-B distribution post. In addition to seven-inch model (below), O-B has a nine-inch post which has withstood similar flashovers.

O-B distribution post withstands ultra-steep waves of .05 microsecond front

If you want protection against lightning damage built right into the insulators for your next distribution line (up to 25 kv), take a good look at the O-B distribution post.

We've just seen new evidence of its ruggedness. With the help of new testing techniques and of new instrumentation, the O-B high-voltage laboratory has produced ultra-steep wave fronts of .05 microseconds and under (remember when a 1½ microsecond front was considered a severe discharge?). Rate of rise of the wave is 7500 kv per microsecond.

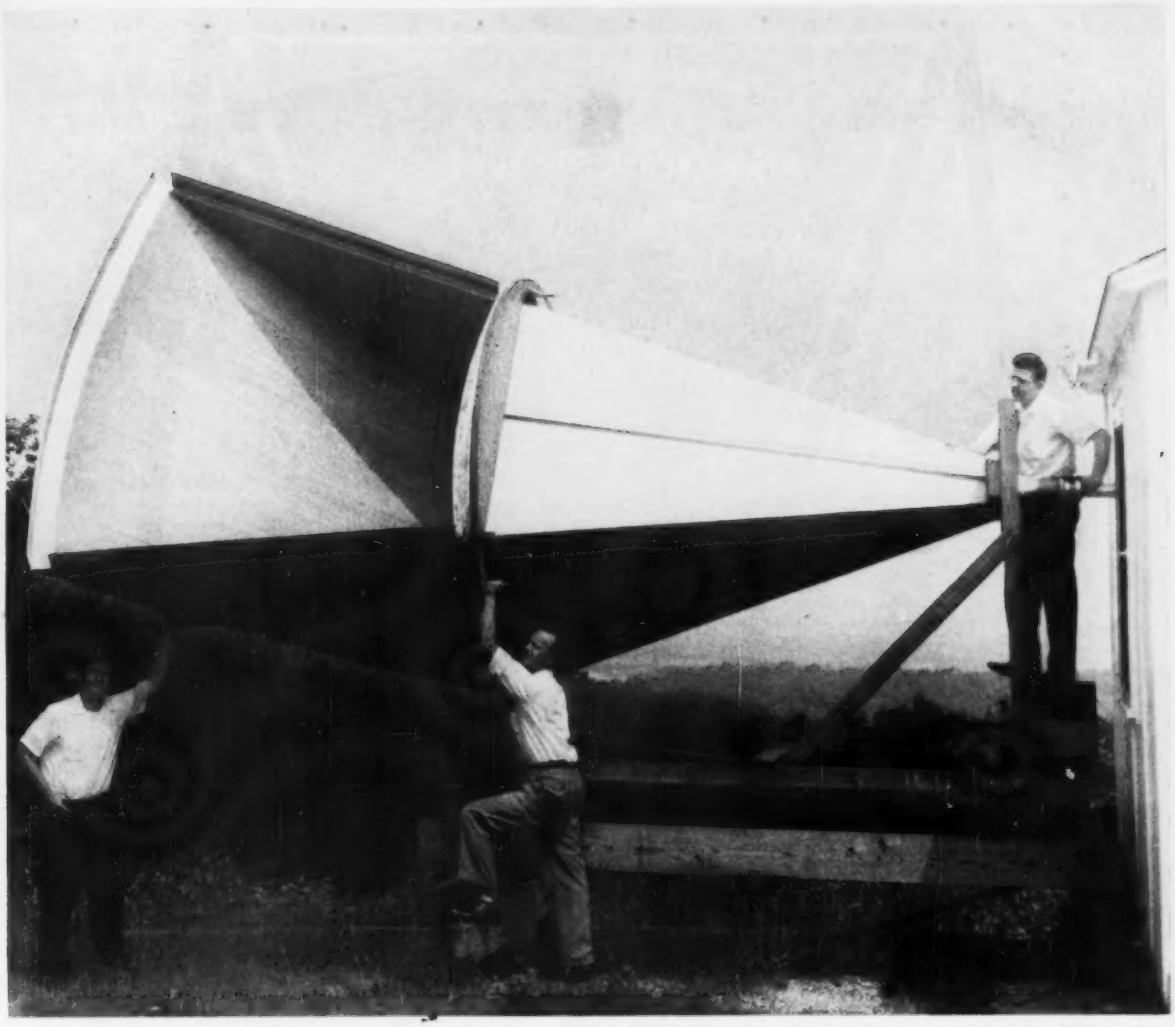
The photograph was taken approximately .01 microseconds *before* flashover and shows the extreme stress exerted on the insulator just before it flashes over — visual proof of ability to stand up under these ultra-steep waves.

O-B has two models of this distribution post. One has a seven-inch porcelain height with 11 inches of leakage distance; the other is nine inches high with 15 inches of leakage distance. You have a choice of studs and brackets to provide a variety of mounting arrangements.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES



At Bell Laboratories, Holmdel, N. J., a horn reflector antenna is beamed skyward by scientists Edward Ohm, David Hogg and Robert DeGrasse. The maser amplifier, which employs a ruby cooled in liquid helium, is inside building at right. Over-all "noise" temperature of antenna, amplifier and sky is only 18°K at 5600 megacycles.

ANOTHER STEP TOWARD SPACE COMMUNICATIONS

The above antenna is part of a new ultra-sensitive radio receiving system under development at Bell Telephone Laboratories. It has extraordinary directivity. Beamed skyward, it ignores radio "noise" from the earth, yet picks up extremely weak signals from outer space.

The signals are amplified by the latest Bell Laboratories "maser" amplifier. The maser principle was first demonstrated, using gas, by Prof. C. H. Townes and his collaborators at Columbia University. Bell Laboratories scientists applied it to the solid state guided by a theoretical proposal of Prof. N. Bloembergen of Harvard University. Their latest traveling wave maser amplifier employs a ruby mounted in a waveguide. The ruby is excited to store energy. As signals pass through, they absorb this energy and are thus amplified. The device uniquely combines the characteristics needed for practical space communication: extremely low inherent noise and the ability to amplify a broad frequency band.

At present the receiving system is being used to pick up and measure minute radio noise generated by the atmosphere. It also foreshadows important advances in long distance communications. For example, it could extend the range of space-probe telemetering systems, could help make possible the transatlantic transmission of telephone and TV signals by bouncing them off balloon satellites—and has numerous applications in radio astronomy and radar.

This pioneer development in radio reception is one more example of the role Bell Laboratories plays in the pursuit of better communications technology.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

BRIDGEPORT ALUMINUM EXTRUSIONS MEAN ECONOMY

In Transmission Towers and Sub-Stations – the original paint job and all subsequent paintings can be eliminated. The natural finish of aluminum is attractive – won't rust or corrode. Aluminum's light weight means that minimum footings can be used . . . transportation costs to sites greatly reduced and erection time cut.

In Bus Conductors – where weight savings up to 60 per cent over other metals can be realized for the same current-carrying capacity. On an equal weight basis, aluminum offers higher thermal conductance than other metals – higher short strength, too.

Bridgeport's Technical Service is personal and fast. Our highly trained engineers are ready to work with you from design to finished extrusions. They will help you choose the best alloy and shape for your particular application.

For more information and prices – call the Bridgeport office near you. Or write us direct.

BRIDGEPORT BRASS COMPANY

Bridgeport 2, Conn. • Sales Offices in Principal Cities

Specialists in Metals from Aluminum to Zirconium

BRASS Bridgeport CO.

3 NEW G-E MOTORS AND 42 QUALITY IMPROVEMENTS

A family appearance in power station motors and 42 basic design improvements are now available from General Electric. The three new enclosures shown here enable electric utilities to select power station motors with the same modern appearance. And all of these new motors contain the same advanced features, painstakingly engineered to meet electric utility standards of reliability.

Among the 42 quality improvements available on all G-E boiler feed pump motors, are:

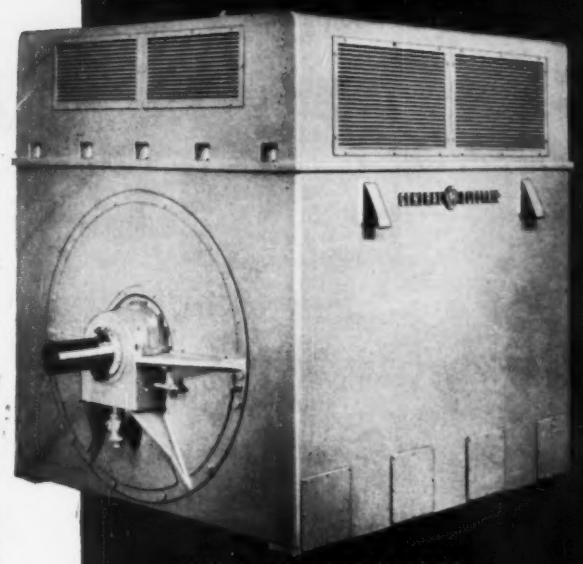
- **Polyseal* insulation system**—sealed against moisture; resists fly ash, most other abrasives.
- **Patented tying system**—heat hardened Permafil glass rovings hold end turns of form wound coils in a vise-like grip for maximum support.
- **Rugged frames**—provide added rigidity and strength required for power station service.
- **Extremely low noise level**—now possible with proven acoustic treatment.
- **Stator connections**—all brazed for more uniform strength, reliability.
- **Controlled slot wedging**—provides tight, stable fit, virtually eliminates coil looseness and resultant wear.

FOR THE COMPLETE STORY on G.E.'s 3 new power station motors and 42 quality improvements, contact your G-E Apparatus Sales engineer or write Section 884-3, General Electric Co., Schenectady 5, New York.

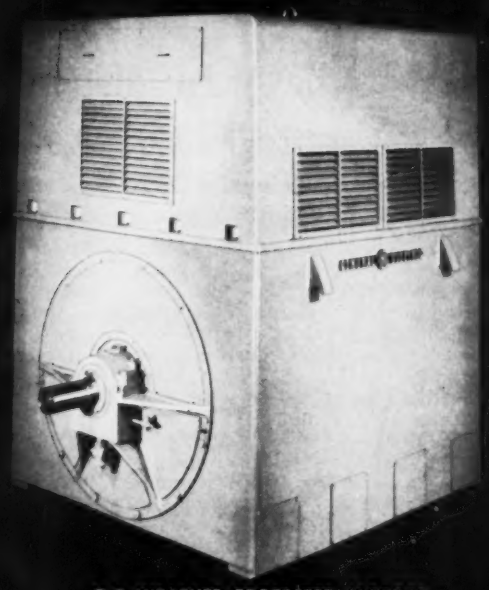
*Trademark of General Electric Co.

Progress Is Our Most Important Product

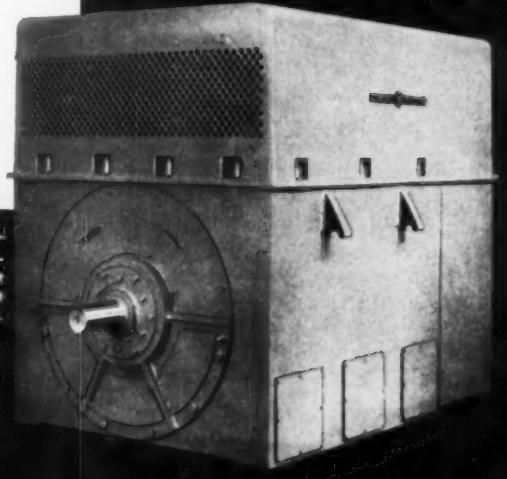
GENERAL ELECTRIC



BOILER FEED PUMP MOTORS—
Large 2-pole dripproof motors are acoustically treated for quiet operation—give long, reliable service.



G-E WEATHER PROTECTED MOTORS—
give better protection against rain, snow—even hurricanes—exceed NEMA Type II definition.



G-E TUBE-COOLED TEFC MOTORS—
are designed for easy disassembly, maintenance and inspection; computers select optimum number, size and arrangement of tubes for most effective ventilation.

another G-E PROJECT '8000' development

PROJECT '8000'—
a major General Electric program of research, product redesign, advanced manufacturing and improved customer service on a-c motors 150- to 6000-hp.

In operation since February, the L&N computer gives Carolina Power & Light Co., the desired generation loading pattern on five of its major plants for strict incremental loading, or modified economy louding. The computer can also be used to study anticipated operating problems and their effects on the cost of operating the system while the load control is still functioning.

Carolina Power & Light Co. closes the control loop with new L&N dispatch computer

New L&N "Desired-Generation" Computers Now Operating On Six Major Power Networks

Like so many utilities, CP&L's steep growth curve of the past ten years is exceeded only by expansion estimates for the next ten. To ensure that system operation remains economical and smooth during rapid expansion, CP&L now uses an L&N Desired-Generation Computer-Control system for automatic control of better than 90 per cent of generation on its major (eastern) operating area. The new control encompasses telemetered values from five tie points and automatic allocation of generation changes among five major generating stations, including 14 units under control.

In moving ahead with an L&N system, CP&L is part of a growing trend, for within a year after installation of the first Desired-Generation Computer, six major American utility networks with a combined capability of 11 million Kw were using L&N computer-controllers.

Suggestion: you can help *your* system make the move to advanced automatic dispatching more objectively — and with confidence — by checking *results* first — the actual operating results being obtained right now from California to Carolina, from Connecticut to Florida (names on request). Then, talk with the men of Leeds & Northrup—or write to 4938 Stenton Avenue, Phila. 44, Pa., about a custom-engineered computer-control for your system—it pays.

Get results on your system with an L&N computer that:

1. *Automatically loads generating units on an incremental cost-of-power-delivered basis—includes incremental generating costs and transmission loss factors (transmission loss matrix optional).*
2. *Provides real operating flexibility: loads on any desired incremental, or modified economy basis, to meet prevailing system conditions.*
3. *Plots "on-the-spot" graphic answers to problems involving economy interchange, power-flow losses or anticipated loading patterns.*
4. *Derives a measured lambda value —incremental cost of power delivered—at all times.*
5. *Invariably adjusts generation in a direction that reduces area requirement.*
6. *Gives each unit a terminal destination.*
7. *Makes it easy to place units on control—just flip a switch—no synchronization required.*
8. *Provides safety margins: adjustable load limit settings are positive, and cannot be exceeded; maximum rates of control action are positive, adjustable, and cannot be overridden.*
9. *Costs less in the long run: requires no unit or governor modifications, goes into service after approximately two to four weeks installation procedure, gives positive assurance against overregulation.*
10. *Is easy to operate—gives any desired readout data, uses compact, convenient digital setters.*

Digital setters are just one of many operating aids built into L&N computers. Compact and easy to use, these setters enable you accurately to feed into the computer a wide range of input data: unit high and low limits, performance factor, type and cost of fuel being used, etc.

LEEDS NORTHRUP

"Over 400 automatic generation control installations"

Weight of 69 kv 3-way, 3 phase switch installation cut by ¼ ton!

ALUMINUM FRAMES

make CHANCE GOABS

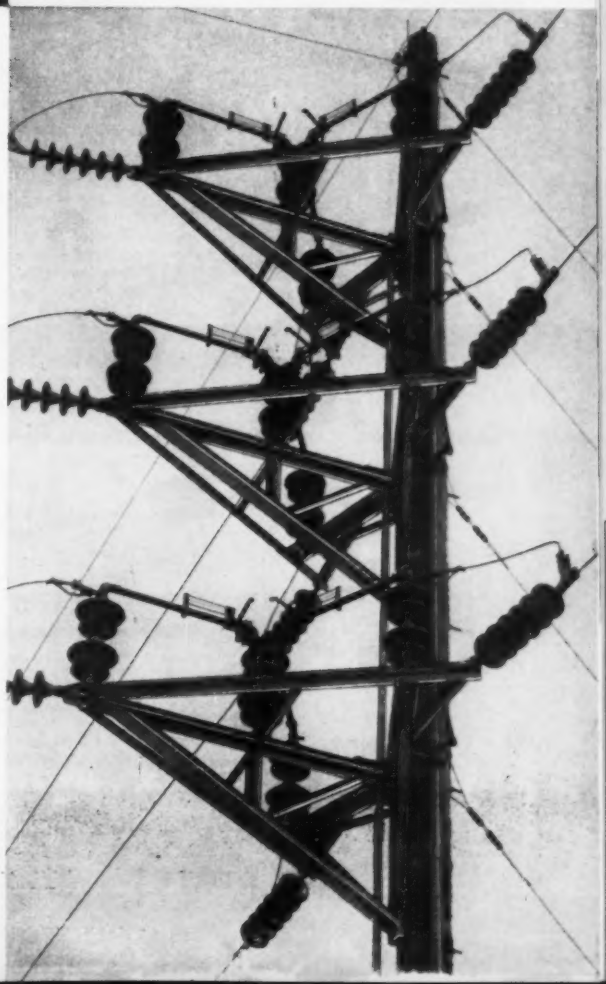
easier to install – lighter on poles

Now, Chance GOABS give you the added advantages of welded structural aluminum frames as standard equipment. The frames have been designed and field-tested to hold the same loads as steel frames—with greater platform stability to assure good switch operation—and with excellent corrosion resistance for longer life.

Frame weights have been reduced from 40% to 66%. The popular 69 kv 3-way frame shown above weighs only 164 pounds (52% less than its steel counterpart). Less weight makes GOABS much easier to transport, to handle and to mount . . . puts less strain on the pole.

You're dollars ahead from the start when you use Chance Group Operated Air Break Switches for tap switching. Vertical phase-above-phase mounting, requiring only a single pole for 1, 2 or 3 way switching, means lower initial costs, lower maintenance costs, and minimum right of way requirements.

You get the finest in advanced engineering design with the Chance line of switching equipment.

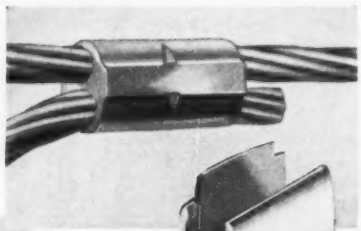


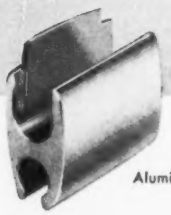
A. B. CHANCE CO CENTRALIA MISSOURI

A. B. Chance Co. of Canada, Ltd., Toronto C659-20

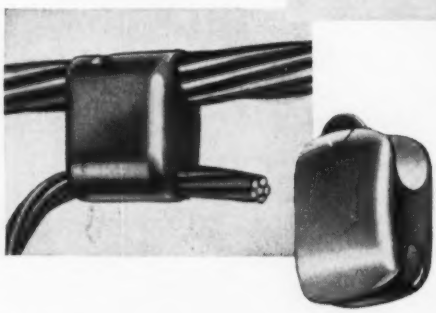
KEARNEY

today's
~~tomorrow's~~ loads demand



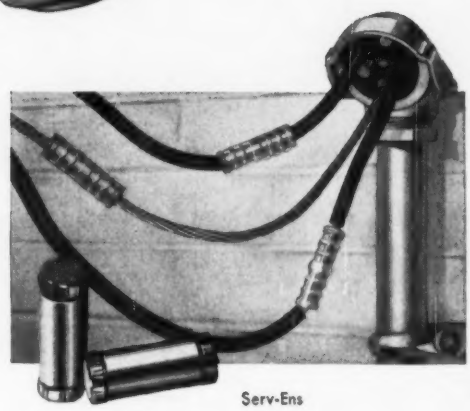


Aluminum Squeezons

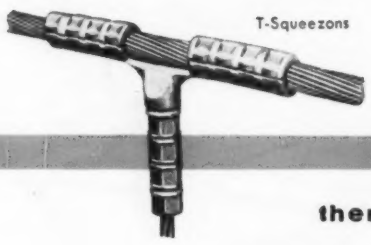


Copper Squeezons

Tension Splicing Sleeves
and Jumper Sleeves



Serv-Ens



T-Squeezons

there's a KEARNEY compression fitting for almost every

Insulated Splices

Bolted Jumper Sleeves

Compression
Terminals

L-Squeezons

L-Squeezon Stirrups

Ground Rod Fittings

Ground Lugs

for better construction - safer maintenance
- specify KEARNEY products

KEARNEY compression fittings

Solve distribution system connection problems with Kearney Compression Fittings . . . get lasting, dependable connection performance under the most rugged operating conditions. Kearney Compression Fittings assure uniformly correct contact pressure, eliminate burndowns and insure extra-long connection life in severely contaminated atmosphere. They prevent contact surface corrosion, eliminate loose or unreliable connections . . . reduce costs. Consider the advantages and economy of Kearney Compression Fittings; write or ask our field representative for more information.

...applied with KEARNEY compression tools

Dies may be easily snapped in or out with fingers only

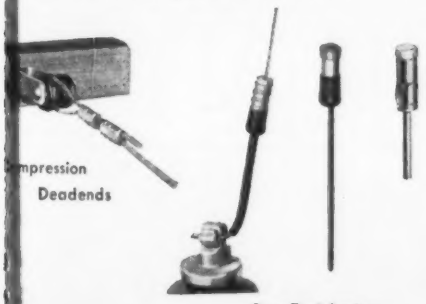
Kearney WH-1 Hydraulic Tool

Fast . . . powerful . . . easy to use. From wide open dies to full compression in less than 20 strokes. Twist of the wrist retracts die or sets tool to make compression. Narrow head for full visibility of work area. Balanced weight for easy positioning. Interchangeable handles available for hot line work.

KEARNEY TYPE O MECHANICAL TOOL

Almost every distribution connection can be made with this ONE lightweight, inexpensive tool. In addition to installing more sizes and types of fittings than tools with fixed dies, the Kearney Type O Mechanical Tool is faster, easier and safer to use. Rugged construction throughout—no complicated parts. Forged steel head, heat treated for high strength. Nose die compresses Serv-Ens and L-Squeezons. Fourteen interchangeable dies cover a wide range of connection fitting jobs.

nection requirement



mpression
Deadends

Serv-En Adapters

these 3 easy steps insure trouble-free electrical connections:

1. Use Kearney Conductor Cleaning Brush to remove corrosion.
2. Apply Kearnalex to aluminum contact surfaces immediately after cleaning to exclude air and moisture . . . maintain maximum efficiency contacts.
3. Seal the connection against moisture and contaminants with Kearney Airseal.

AMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue • St. Louis 10, Missouri

...ces at: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH AND CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

403

WAGNER Dry-Type *General Purpose* Transformers

...WHISPER WHILE THEY WORK

New... from Wagner... totally enclosed dry-type transformers *filled with epoxy compound.* Their designation: Type AE Single Phase, 1 to 10 Kva.

Use these transformers for all general purpose applications, including those where noise must be minimized. They have a low sound level... the result of encasing smaller Form W core and coils in solid epoxy compound. The compound insulates, reduces sound-producing vibration caused by core excitation ... and provides enough support and mechanical strength to eliminate the need for metal framework and other subassemblies that are subject to vibration. *The result:* a whisper-quiet transformer that can be used anywhere, even in quiet areas of offices and hospitals.

Wagner Type AE transformers do more than silence sound, of course. They improve voltage regulation, and have better insulation protection (suitable for continuous operation at 80°C in a 40°C ambient). All parts are sealed from dust, moisture and corrosion by the epoxy compound. Naturally, every unit is built to conform to all applicable standards of ASA and NEMA.

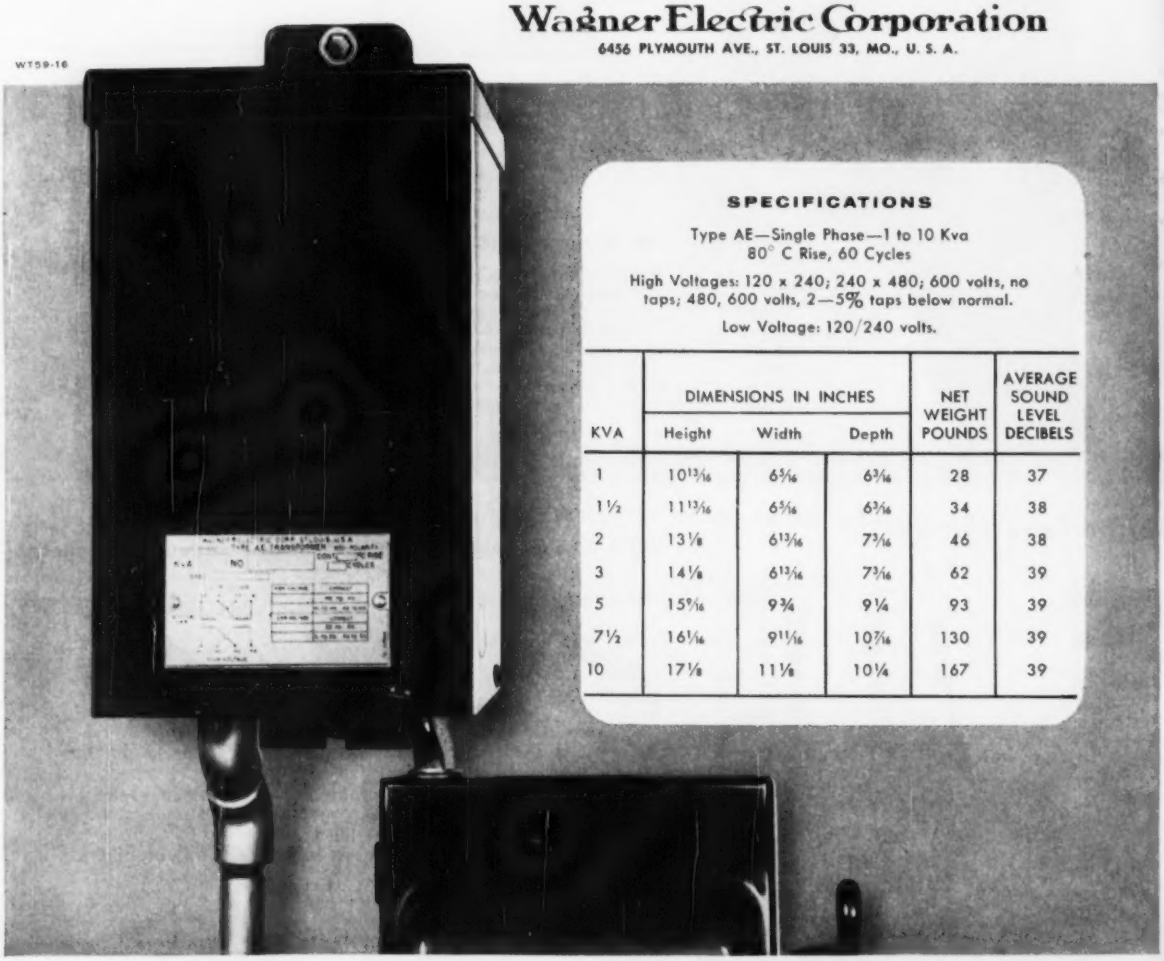
Wagner Type AE transformers can be installed indoors or out... in any location where they will not be submerged or exposed to injurious fumes in concentration. They are compact and lightweight and can be mounted in any position, at any angle... on walls, floors, or ceilings.

Like to know more? Wagner branches and distributors have all the details. There's one near you. Call or write now.

Wagner Electric Corporation

6456 PLYMOUTH AVE., ST. LOUIS 33, MO., U. S. A.

WT59-16



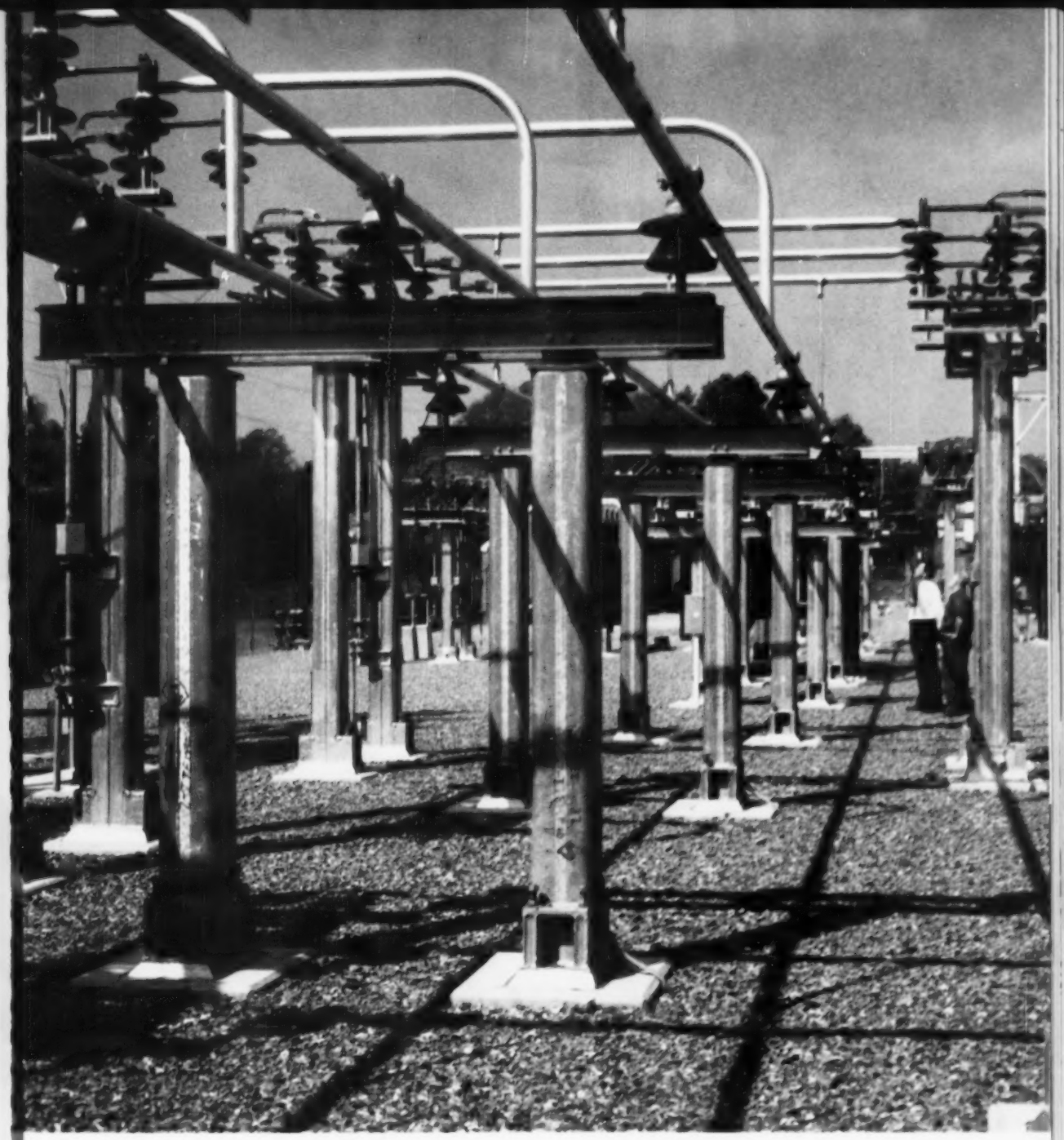
SPECIFICATIONS

Type AE—Single Phase—1 to 10 Kva
80° C Rise, 60 Cycles

High Voltages: 120 x 240; 240 x 480; 600 volts, no taps; 480, 600 volts, 2—5% taps below normal.

Low Voltage: 120/240 volts.

KVA	DIMENSIONS IN INCHES			NET WEIGHT POUNDS	AVERAGE SOUND LEVEL DECIBELS
	Height	Width	Depth		
1	10 13/16	6 5/16	6 3/16	28	37
1½	11 13/16	6 5/16	6 3/16	34	38
2	13 1/8	6 13/16	7 3/16	46	38
3	14 1/8	6 13/16	7 3/16	62	39
5	15 5/16	9 3/4	9 1/4	93	39
7½	16 1/16	9 11/16	10 7/16	130	39
10	17 1/8	11 1/8	10 1/4	167	39



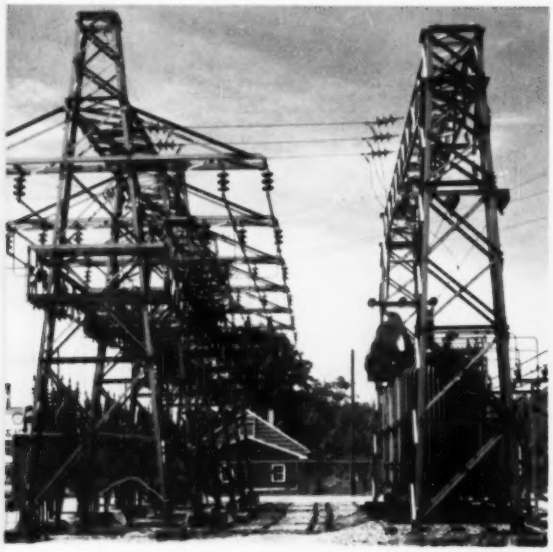
Philadelphia Electric's Bryn Mawr station utilizes a box column design in the structures. Columns were shop-fabricated by welding together two formed plate aluminum alloy channels. Use of aluminum bus also is another step toward an economical, maintenance-free station.

HOW ALCOA ALUMINUM TRIMS COSTS IN SUBSTATION STRUCTURES

ALCOA RESEARCH

. . . development today for tomorrow's loads

ALCOA STRUCTURAL ALUMINUM PROVIDES NEW ECONOMIES IN SUBSTATIONS



Pennsylvania Electric Company's switching yard at Erie is one of the earliest aluminum utility substation installations in the U.S. These aluminum structures are as sound and attractive today as when erected in 1946 . . . without a penny invested for maintenance or painting.

City of Seattle, Wash., Duwamish Substation.

Alcoa research for over 50 years has been devoted to a broad search for new and improved applications of aluminum within the electrical industry. The objective has been singular and unchanged: to reduce costs while advancing standards of performance.

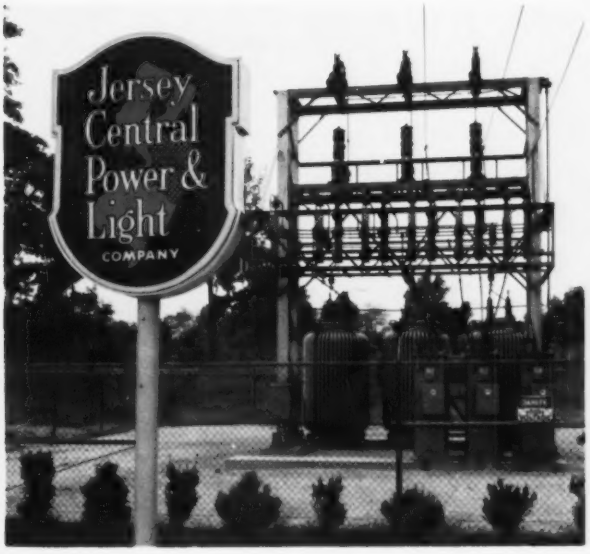
Over 10 years' experience with utility installations throughout the country has proven the many money-saving features of Alcoa® Aluminum for substation structures. Only a third the weight of steel, aluminum is much easier and cheaper to handle . . . often permits erection without any materials handling equipment at all! It can be fabricated with ordinary shop tools. But aluminum's real forte, of course, is its highly corrosion-resistant qualities. Aluminum structures, even where exposed to most corrosive industrial atmospheres, never need painting even after alteration in the field.

ALCOA ALUMINUM

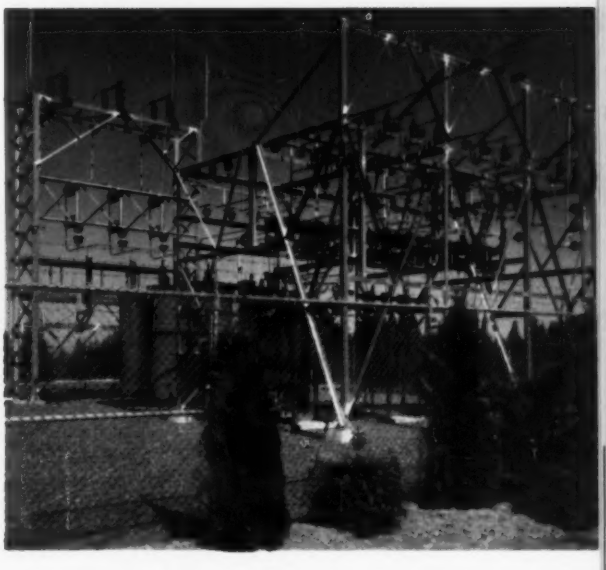
ALUMINUM COMPANY OF AMERICA

ALCOA RESEARCH

. . . development today
for tomorrow's loads



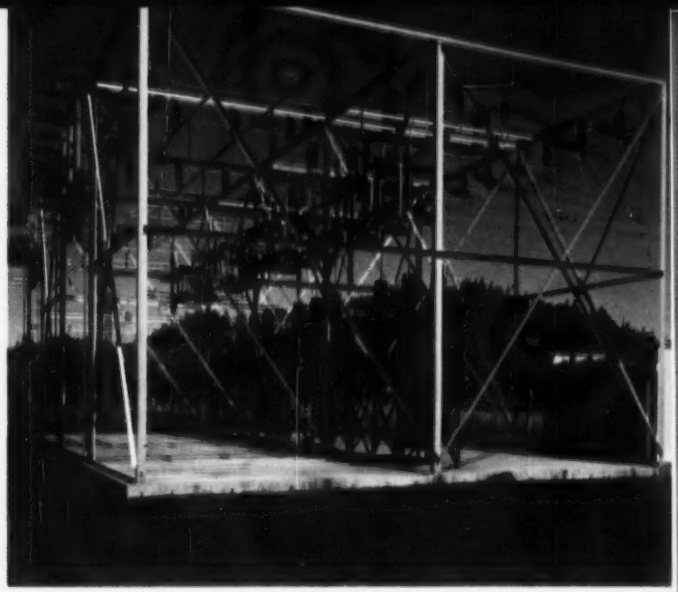
Alcoa Aluminum structures are ideal in coastal areas such as this Jersey Central Power & Light Company station near Lawrence Harbor, N. J. Aluminum is highly resistant to the corrosion that causes severe mortality in steel substation structures. Steel in this atmosphere usually requires two coats of paint every five years. Painting near energized circuits creates safety hazards . . . or requires outages for maintenance. Alcoa Aluminum never needs upkeep!



The bright, clean appearance of Alcoa Aluminum gives substations a good-neighbor atmosphere that is so important in suburban areas. Outdoor substations, like the L. M. Jones station of Clarke County Public Utility District, near Vancouver, Wash., present a consistent, like-new appearance over many years when made of lightweight, moneysaving aluminum.

ALCOA SUBSTATION STRUCTURES

. . . EASY TO INSTALL
. . . EASY TO HANDLE
. . . NO MAINTENANCE



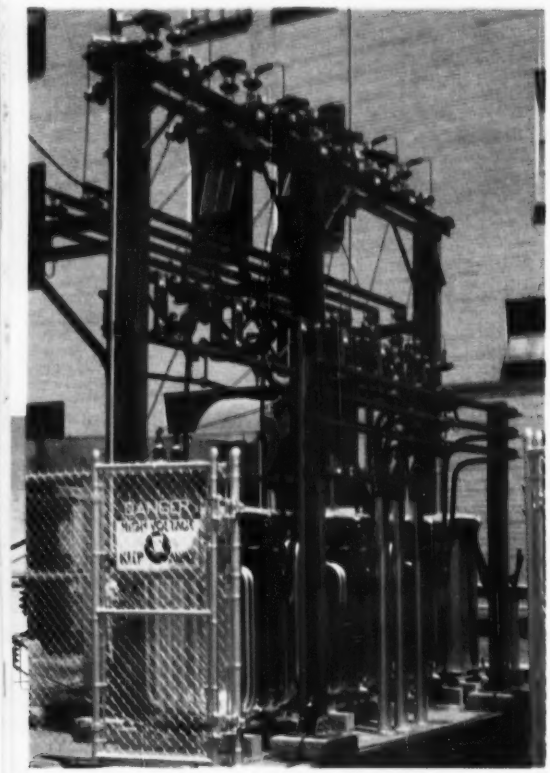
Cowlitz County P.U.D., Mount Solo switching station at Longview, Wash.

First installed experimentally for substations in the early 1940's, Alcoa Aluminum has rapidly gained wide acceptance as a structural material in large and small outdoor substation structures. Hundreds of thousands of tests have been conducted since those initial utility structures were designed to develop stronger, lighter and cheaper alloys that will give maximum corrosion resistance and still keep the bright, new appearance of aluminum.

Savings in handling and ease of erection help make Alcoa Aluminum more economical than any other structural material available. These features, combined with aluminum's maintenance-free characteristic, quickly offset any material price differential of the original structure compared to steel. Maintenance on steel structures in some corrosive atmospheres often equals the original cost during a 30-year span. Alcoa Aluminum requires no upkeep.

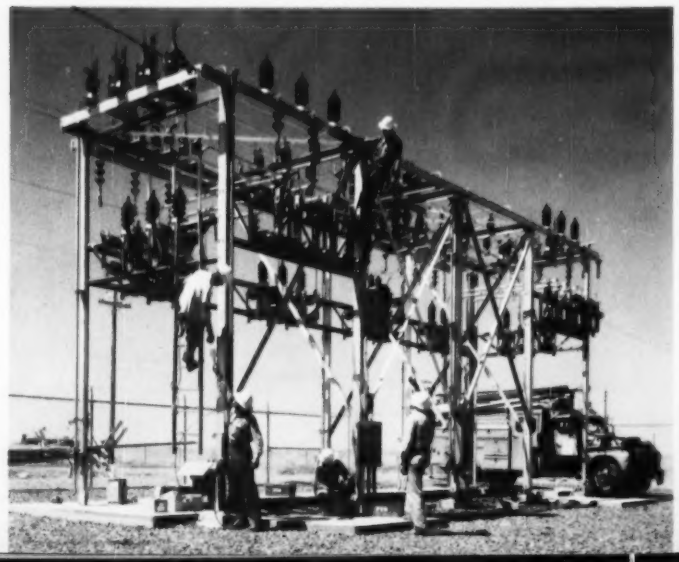
Light enough to be handled manually by the erection crew in most cases, aluminum structures can often be set up without cranes or derricks. Structures can be readily loaded on trucks and carried to the site by the crew.

The excellent electrical conductivity of aluminum is advantageous in facilitating grounding of electrical equipment . . . another saving with Alcoa Aluminum.



The aluminum substation constructed at Alcoa's Research Laboratory in New Kensington, Pa., in 1945 is believed to be the first. Fourteen years of continuous service by this Alcoa pioneer effort has confirmed the economies of aluminum as a structural material. The aluminum is as sound as the day it was erected . . . with no maintenance.

Larson switching station, Grant County P.U.D. near Moses Lake, Wash.

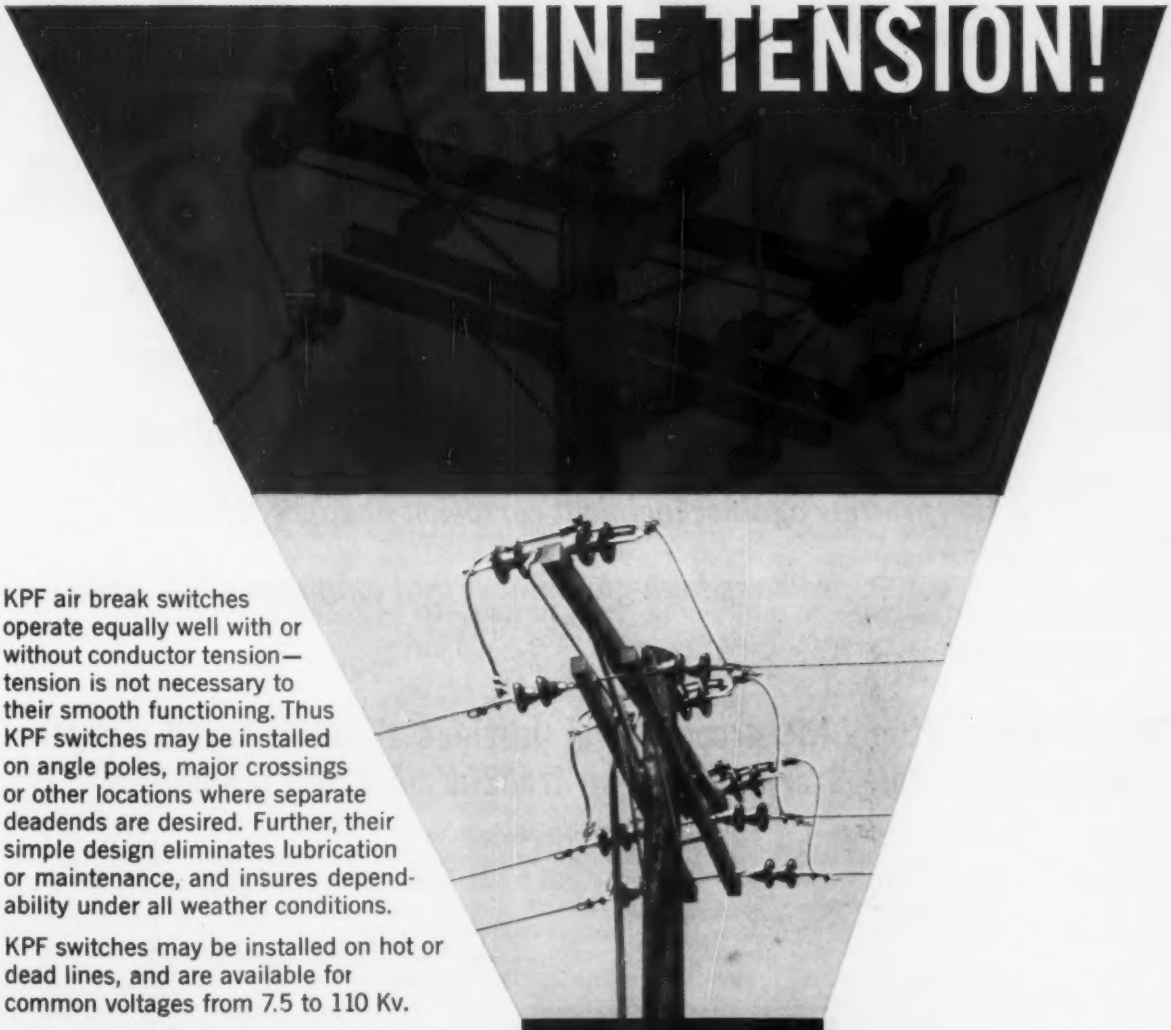


Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

INSTALL KPF SWITCHES WITH OR WITHOUT LINE TENSION!



KPF air break switches operate equally well with or without conductor tension—tension is not necessary to their smooth functioning. Thus KPF switches may be installed on angle poles, major crossings or other locations where separate deadends are desired. Further, their simple design eliminates lubrication or maintenance, and insures dependability under all weather conditions.

KPF switches may be installed on hot or dead lines, and are available for common voltages from 7.5 to 110 Kv.

Test KPF switches with an installation on your own system. Inquire now!

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AIR BREAK SWITCHES
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NOW... Pennsylvania doubles the tank protection of Pole Star transformers and regulators with new V.I.P.

V.I.P. *pretreats tank surfaces to resist corrosion*

V.I.P. *prevents spread of rust if scratches occur in handling*

V.I.P. *provides extra-high resistance to moisture, alkali, acids*

V.I.P. *protects against incipient corrosion at edges, corners*

V.I.P. *produces high-gloss finish that long retains its luster*

This is the 5-Step V.I.P. process that provides all-weather, all-climate protection for Pole Star distribution transformers and regulators

The sketch at left illustrates the five-step V.I.P. Finish (vinyl with inner phosphate). Note that it is not just a new paint, but a complete metal-finishing process that assures all-climate, all-weather protection.

1. Shot-blasting with steel grit removes all scale, grease and dirt, and provides "toothage" for adhesion of the first coat to the steel surface.

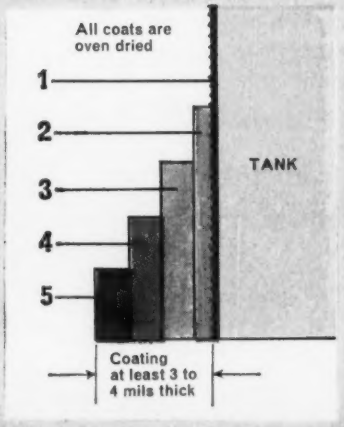
2. A combination chemical pretreatment and primer applied by the flow method simultaneously form a phosphate coat and thin organic film on the clean metal. This is the step that gives V.I.P. its ability to prevent the spread of corrosion, even if the metal is scraped bare in spots.

3. A tough vinyl combined with non-leafing aluminum form an almost impenetrable surface against moisture or moisture vapor. This coat is flowed on.

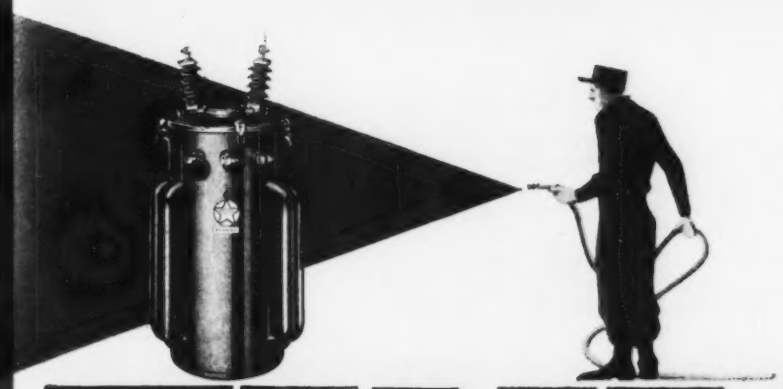
4. An alkyd-titanium paint (used successfully on Pole Star Transformers for many years) is flowed on to provide a heavy, uniform coverage.

5. A final coat of blue-gray alkyd-titanium paint is sprayed on to assure a smooth finish with a maximum gloss. This, together with the preceding coat, forms a hard, elastic finish that resists weathering and does not fade or chalk too quickly.

Total thickness is three to four mils. All coats are oven dried at controlled temperatures.



Pennsylvania POLE STAR Distribution



FINISH*

*Vinyl with Inner Phosphate

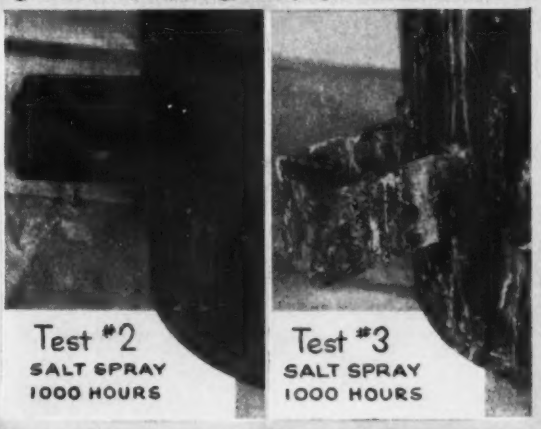
The new V.I.P. Finish for Pole Star Distribution Transformers and Regulators is *more* than a paint. Basically a *vinyl* finish with an *inner phosphate* coating, V.I.P. Finish gains its outstanding characteristics from careful preparation and pretreatment of the metal, followed by meticulously controlled application of the various coats.

A principal reason for the amazing weatherability of V.I.P. Finish is that it provides not only extra-high *primary* resistance to moisture, alkali and acids . . . but also sets up a secondary or insurance barrier that prevents the spread of corrosion if any bare metal becomes exposed, as in the case of accidental scratching. Such spots can be touched up with complete assurance that no underfilm corrosion will occur.

V.I.P. Finish is designed to save maintenance costs, even when transformers and regulators are exposed to the most highly corrosive atmospheres. Tests prove this. To take advantage of new V.I.P. Finish on your next distribution transformers or regulators, contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pennsylvania.

McGRAW-EDISON

Here is just one of the dozens of tests that prove outstanding superiority of V.I.P. finish... culmination of 15 years of research on protection of transformer tanks against water, ice, smog, salt spray and wind.



Salt Spray Tests

Temperature of cabinet: 95 F ±5 F. Salt solution: 20% (specific gravity of 1.126-1.158). Minimum duration of tests: 1000 hours. Ratings, as shown in the following table, were on the basis of "10" for perfect and "0" for complete failure.

RATINGS

System	Thickness (Mils)	Blistering	Underfilm Corrosion	Loss of Adhesion	Average
V.I.P. Finish	3-4	9.0	9.5	10.0	9.8
Ordinary Finish	2-3	0.0	4.0	5.0	3.0

In this most rigorous of all tests, V.I.P. Finish (lefthand photograph) rated excellent on all counts. Note the amazing degree of effectiveness around lift lug and mounting bracket.

Ordinary transformer paint system (righthand photograph) scored *less than half* as well as V.I.P. Finish on all counts. Extreme corrosion was evident in some spots.

Transformers and Regulators

FROM SANGAMO:

Another new product developed to meet your needs

P-3 METER ASSURES FULL R

Full 200 Ampere Capacity in a Single Disk Three Stator Meter

The increased capacity and reduced price of the P-3 meter make its cost/KVA only $1.21 compared to $2.06 for bathtub-type three stator meters—a difference of 85 cents/KVA of meter capacity.

The benefits of three stator accuracy should be re-evaluated now that the P-3 meter offers lower cost/KVA. The difference in installed cost of P-3 and 2½-stator meters is insignificant for self-contained installations to 200 amperes and for current transformer installations. The small difference in installation cost should be compared to the possible loss of revenue from meters that do not offer three stator accuracy.

Greater sustained accuracy—Near perfect load response to 200 amperes. Slow disk speed (8⅓ revolutions per minute) and very high torque on single disk permits reduced series damping—minimizes speed variations and compensations.

Easier to handle—The single disk round design cuts weight by 50%—volume by 50%—as compared to bathtub-type three stator meters.

THE ONLY COMPLETE LINE

Class 10—bottom-connected and socket meters for transformer-rated installations.

Class 100 and 200—socket construction for growing loads.

SANGAMO

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

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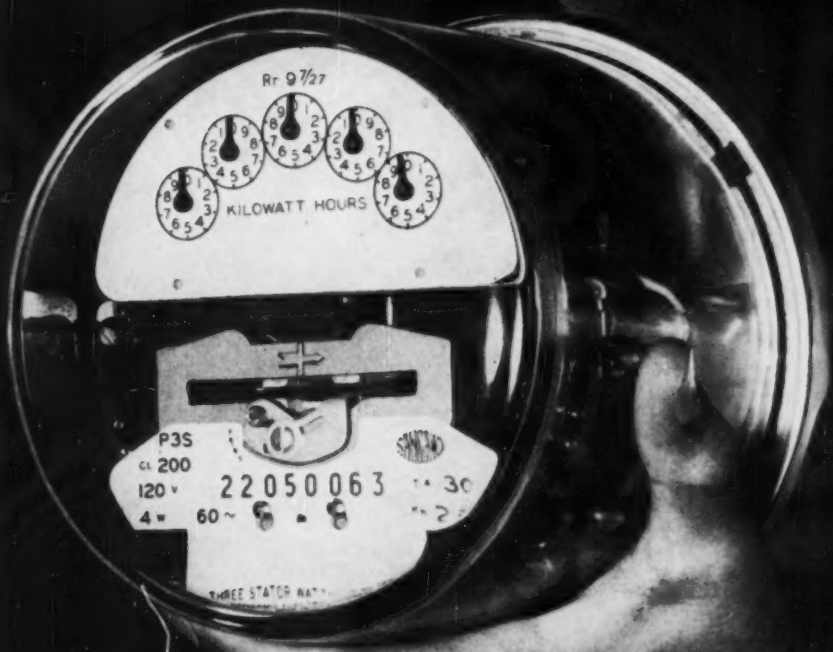
REVENUE FROM LARGE LOADS



NOW... A 5% PRICE REDUCTION gives you *three stator accuracy* for an *installed cost* only slightly more than compromise metering.

What's new in plant expansion?

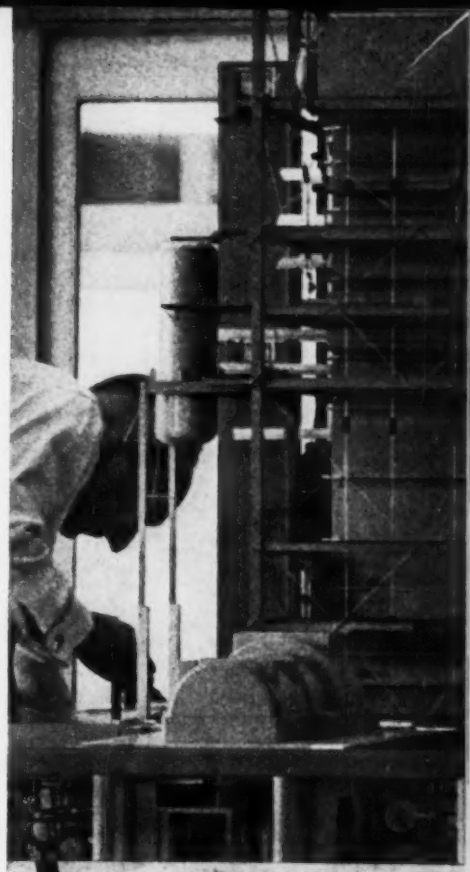
Steadily rising costs are causing many electric utilities to take a searching look at traditional methods of handling plant expansion.

An increasing number of companies are finding that the total-responsibility contract, which has long been standard practice in the petroleum and chemical industries, offers important advantages to a utility.

When a single integrated firm is given full responsibility for design, engineering and construction and undertakes to deliver a plant that meets definite performance guarantees, then the contractor is also in a position to guarantee completion date and total cost—*and should be willing to do so.* With these two factors firmed up, financing problems are eased considerably. Risks are minimized, as the contractor assumes most of them. Lead time is shortened and continuity of the job is assured. The utility's own engineers, freed from a multitude of detailed responsibilities, can function on their proper level of operations management, broad supervision and long-range planning.

Furthermore, the integrated contractor, in control of all phases of the job and making a single profit, has a considerable advantage over a series of independent contractors handling separate phases. Through efficient management, procurement and scheduling he should be able to deliver more total plant value per dollar of investment.

It is Fluor's belief that the total-responsibility contract, with price and completion guarantees, is the best answer in many electric-utility situations, and Fluor is one of a very few engineering-construction firms serving the industry which encourage this type of contract. For detailed information on how the system works, write to Utility Sales Department, The Fluor Corporation, Ltd., 2500 South Atlantic Boulevard, Los Angeles 22, California.



When you consider expansion . . . the most important investment you can make is in the creative ability of men.

FLUOR

Engineers and Constructors

HOISTING THE DRUM—dramatic moment in the construction of every steam station. This one is being installed by Fluor at Cameo, Colorado, where Public Service Company of Colorado is adding a 44-mw. unit to its existing plant.

ELECTRONIC TESTING... BY PUSH BUTTON!

Patent applied for.

Yes, just push a button and automatically, Moloney Distribution Transformers are Tested, Proved and on their way ... all neatly crated, of course ... to your utility.

Our automatic testing system, applied to our enlarged production facilities, guarantees production of Moloney Transformers of the quality you want, in the quantities and ratings you want.

Control room for the automatic test system contains equipment which automatically records test data for each transformer as it goes through the test area.

ME58-14

Manufacturers of MOLONEY ELECTRIC® *Transformers for Utilities, Industry and Electronic Applications*

SALES OFFICES IN ALL PRINCIPAL CITIES

FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

Editorial Comment

NOVEMBER 2, 1959

An Open Letter to the Soviet Minister of Power Stations

Dear Mr. Novikov:

In this issue of Electrical World you will find a critical analysis of the Soviet seven-year program of power station expansion as you described it in the May 1959 issue of *Teploenergetika*. Written by Philip Sporn, a recognized pioneer in modern steam station technology and head of one of the largest U. S. power systems, this analysis and comparison with U. S. progress and plans is, we believe, the most authoritative and comprehensive paper we have ever printed in this area.

The prominence of the author and the space we have devoted to the article are a measure of the intense interest all segments of the American electric power industry have in your progress and plans. We feel this definitive review of your program goes far toward filling the informational void which has existed. And we congratulate you upon the thoroughness of your planning.

As Mr. Sporn indicates, there are, however, certain areas in which more information is needed if the analysis is to be thorough. In the interest of broader exchanges of technical knowledge, we sincerely invite you, Mr. Novikov, to make any comments you may feel proper on Mr. Sporn's analysis and comparison.

We will deem it a privilege to carry in this magazine any such comments you may wish to make which will add to the understanding of the economic and technical aspects of your seven-year program.

Sincerely,
The Editor

Mr. I. T. Novikov
Minister of Power Stations
The Kremlin
Moscow, USSR

Rate Cases Judged by Two Tribunals

Every utility rate case is tried twice: Once before the regulatory commission, and once before the larger tribunal of public opinion.

Confirmation of this thesis came from a most authoritative source last month, when Alan S. Boyd of the Florida Railroad & Public Utilities Commission told the 71st annual convention of the National Association of Railroad & Public Utilities Commissioners that he hoped the utilities would find "a means of presenting a rate case so that the general public will understand the facts and the issues . . ."

Here is a bit of frank advice that utility managements would do well to think over carefully. For if rate cases are sometimes poorly presented before the commissions, they are frequently butchered when it comes to presenting them before the public.

On the other hand, effort expended in convincing the public of the need for higher rates can pay off. A brief case history illustrates this:

Some years ago, a company applied for a rate increase. Soon after filing, management called all supervisors to a meeting and told them why the hike was necessary. The supervisors told the story to the other employees, and the employees spread the word to their wives and neighbors in casual conversation.

Not one objection was raised when the commission held a public hearing on the case. The company got the increase almost immediately. It's in the book.

PLAYGROUND PATROL requires inside inspection in Manhattan where 10,000-lumen street light fails to penetrate

Studies Back Police Chiefs' Views: G

It was after midnight on a steamy summer night in midtown Manhattan. In a playground on the West Side — an area that tourist-bus drivers still point out as Hell's Kitchen—five boys and a girl had gathered. A group of teenagers joined them, argued, struck and fled. Two boys died of knife wounds.

The fatalities—seventh and eighth in a series of youth-gang killings since the first of the year—rocked New York City residents to the core.

Mayor Robert Wagner called for a seven-point program to stem not only the gang warfare, but the city's rising juvenile crime rate as well. One point was an "immediate increase in lighting in city parks."

The relighting directive ended up in the hands of Armand D'Angelo,

How Improved Street Lighting Cut New York City Crime

Precinct and Borough	1958-1959 Period Covered	Crimes of Personal Violence			All other Crimes or Offenses			Juvenile Delinquency		
		1958	1959	% Decrease	1958	1959	% Decrease	1958	1959	% Decrease
25, Manhattan	May to Feb.	167	55	—67	389	310	—20	70	45	— 36
42, Bronx	May to Feb.	35	23	—34	119	97	—18	15	14	— 7
75, Brooklyn	July to Feb.	18	12	—33	169	125	—26	4	9	+125
78, Brooklyn	May to Feb.	21	15	—29	161	195	+21	1	7	+600
103, Queens	May to Feb.	21	12	—43	131	123	— 6	0	3	
Overall	May to Feb.	262	117	—55	969	850	—12	90	78	— 13
Previous	May to Jan.	249	107	—57	908	792	—13	86	74	— 14

AFTER RELIGHTING, security check is made outside; 400-w spotlights and two brighter street lights double lumen output

Good Lighting Helps Cut Crime

the commissioner of the city's Department of Water Supply, Gas & Electricity—the agency responsible for the 195,000 street lights in New York's five boroughs.

D'Angelo came up with $100,000 to revamp lighting for 20 problem playgrounds selected for their high crime rate. If the improvements reduce crime, the program will be expanded for other playgrounds.

The first installation was at the playground where the two killings occured. There, four blocks from Times Square, four mercury-vapor standards were put in—two angled to illuminate both street and playground, and another pair shining on the block-wide concrete playground. These lights are supplemented by floods and spots.

Still dimly lighted in comparison with a parking lot down the street, the playground has had no trouble since the relighting. So far, it's difficult to determine whether the improvement comes from the lighting or the new policemen added to nearby beats.

"We know from experience that there is a great relationship between good lighting and reducing crime," D'Angelo said in a recent interview.

D'Angelo knows because, in cooperation with police officials, his department earlier this year completed a two-year survey (see p 50), which showed personal crimes of violence—assaults, rape, and murder—were reduced by half in neighborhoods where improved street lights now shine.

In talks with police chiefs, city lighting engineers and utility executives elsewhere in the U. S., Electrical World heard a unanimous chorus to D'Angelo's view of the lighting-crime relationship. Few policemen or utilitymen, however, have D'Angelo's advantage of a comprehensive study which they can use to promote better street and playground lighting.

In the relatively small number of cities and towns, though, where before-and-after statistics have been compiled, the findings are the same: Improved street lighting cuts the rates in almost all of the crime categories.

New York's spot crime-cutting success resulted from a $500,000 relighting program in five trouble-prone neighborhoods covering a total of 111 blocks. Commissioner D'Angelo's department is presently

Night Crime's Framework

Of all street crimes in the U. S., 72.6% occur during the hours of darkness. The national breakdown for the nighttime ratio goes like this:

Murder and non-negligent manslaughter	74.99%
Rape	76.2 %
Robbery	83.35%
Aggravated assault	70.18%
Burglary, breaking and entering	81.97%
Larceny-theft	52.91%
Auto theft	68.88%

The country's total annual crime bill is estimated at $10,350,000,000.

TEST AREA in Manhattan had incandescent lights on 22-ft mountings spaced 175-ft apart prior to New York's $500,000 program to modernize 111 blocks

CRIME DROPPED 67% in 'personal violence' category for nine months after relighting with 400-w mercury vapor lights on 28-ft mounting with 125-ft spacing

pushing ahead with a new $502,000 program in four other sections where there is a high incidence of crime.

The city's Board of Estimate was urged to allocate $26.5 million to D'Angelo's department during the next six years for street, park and playground lighting modernization.

The survey has aroused interest in all sections of the U. S., D'Angelo said. "We've had calls and letters from dozens and dozens of people wanting detailed information on both the study and our relighting program."

This interest was evident when EW editors interviewed delegates to the International Police Chiefs convention held recently in New York. Interestingly enough, none of the contacted chiefs could recall their association ever dealing with an analysis of street lighting and crime relationship in past conventions.

Individually, however, they recognized the crime-inhibiting features of good lighting and agreed that the most effective law enforcement at night is possible only where there is suitable illumination.

The convention-going chiefs and those contacted at their headquarters noted several trends to augment the effectiveness of street lights. Campaigns are under way against all-night auto parking, which tends to cast shadows and makes observation of residential streets more difficult. Proper tree trimming is getting police encouragement. And fewer street lights are turned off these days during the hours after midnight.

With statistical evidence growing on the good lighting-low crime relationship, it appears that city and county officials, most of whom control local street lighting programs, are about due for a campaign by an informed electorate aided by electrical equipment manufacturers and utilities.

This conclusion is based on reports like New York Police Commissioner Stephen P. Kennedy issued last week. His department, still short of what is considered an adequate force, and plagued by a growing crime rate among teenagers, received 2.2% more complaints in the first nine months of 1959 than in the same 1958 period.

This gain includes a 13.5% increase in murder, 11.8% rape, and 6.2% felonious assault—crimes that flourish at night.

Youths under 16 years of age committed ten more murders and non-negligent manslaughters this year than in 1958. The 16-20 year olds committed 31 more in a period when 303 New Yorkers were killed.

Outlook Is 'Gloomy'

Kennedy called the city's crime outlook "gloomy." His appraisal is shared in other cities by police officials who have tabulated a 40% increase in major crimes from 1946 to 1956, and have noted no improvement in subsequent years.

Some of the gloominess has lifted where street lighting modernization has proved to be an effective, often dramatic police tool. Items:

- Last year the Boston City Council asked the mayor to order more street lighting for the South End. This stemmed from a petition signed by 300 residents of the section, which has one of the city's highest per-capita crime rates.

A South End "crime-light" study pinpointed the location of 104 offenses, ranging from purse snatching to assault, committed from August through December. The study showed that blocks with modern lighting had less crime.

A strong plus for the city's street lighting modernization is the mayor's Neighborhood Rehabilitation Committee, which views it as a crime deterrent as well as a stimulant to retail business and a preventative for traffic casualties.

- Police conducted a survey in West Covina, Calif., from Jan. 1, 1957 to July 31, 1958. Two unlighted residential districts were

compared with two lighted districts, similar in distance from freeways, churches, shopping centers and schools. In the dark sections, crimes increased 127.3% over the lighted districts during the year and a half. The city is in Los Angeles County and has a population of 47,500.

● Omaha Police Chief C. Harold Ostler is planning a survey on street lighting and crime. This was spurred after he attended a Cincinnati police chiefs' convention. The use of lighting as an effective police tool came up for discussion—most of it in odd-hours bull sessions—he said.

● A police official in a large Midwestern city made a three-month study of his own. He found that rape, robberies, auto theft, aggravated assault and burglaries remained at the same rate or decreased. These reductions took place during a period when city wide rates for these crimes increased.

● The crime rate in Flint, Mich., tumbled as a result of a relighting program by Consumers Power Co. Nighttime crimes in the downtown area decreased by 60% in the first six months following the modernization.

Ninety-four felonies and misdemeanors were registered in the six months prior to the Flint relighting, compared with only 38 in the same area for the study period.

● Modern street lighting was a prime factor in an unusual record compiled at McPherson, Kan. In the first year after the lights were installed, there were no reported peeping toms, house burglaries and prowlings, says Police Chief Paul Smith. In the previous decade, an average of 30 cases per year was reported.

● Washington, D. C., has "substantially reduced" crime and traffic accidents in areas where new street lighting has been installed. In one area, personal interviews with 218 residents disclosed that all expressed feelings of greater security in traveling to and from their homes when it was dark.

● Cleveland's recent completion of a six-year lighting program was accompanied by a 44% decrease of attacks and assaults on women and street robberies went down 27%. In 1946, there were 201 night time purse snatchings; in 1957, this diminished to 44, a drop of 78%.

In Cleveland, Commissioner of

(*Continued on page* 138)

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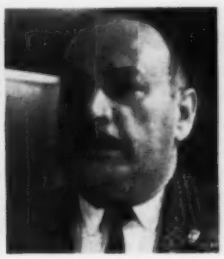

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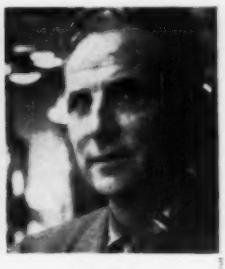


ALLEN

What Police Chiefs Say on Lighting-Crime Relationship

Boston: Good street lighting is a "strong deterrent" to commission of crime and "is a good preventive of muggings." Business areas, in particular, can be safeguarded better.—*Hector Pelletier Cohasset, Mass., chief and executive secretary, Massachusetts Police Chiefs Assn.*

Arlington, Mass: "We consider it vital to nighttime public safety. Many police departments now use patrol cars extensively instead of 'beat patrolmen,' and these cars can watch over areas more closely and cover more ground if good illumination provides a wide view."—*Albert A. Ryan.*

Cleveland: "A well-lighted street immeasurably assists the police officers in patroling the streets. Good, modern street lighting chases the shadows and, as a result, criminals also run."—*Frank Story.*

Beverly Hills, Calif.: "There is no question that it's a deterrent to crime."—*Clinton Anderson.*

Chicago: "The absence of street lighting does not cause crime, it only gives a greater opportunity for crime."—*Peterson, Chicago Crime Commission.*

Laconia, N. H.: "We changed the street lighting in our town and this definitely decreased crime."—*Charles E. Dunleavy.*

Randolph Twp, Mt. Freedom, N. J.: "It's like putting an extra man on the beat."—*George Okun.*

Highwood, Ill.: "New street lighting helps a lot in preventing crime. We have already re-lighted the downtown area and hope someday to re-light the whole town, especially the alleys."—*Theodore Benvenuti.*

Santa Ana, Calif.: "All crimes seek darkness, both physical and mental. It was one of the arguments we used in getting an increase in street lighting. We also are keeping lights on later at night."—*Edward J. Allen.*

Lynn, Mass.: "It's very important in reducing crime . . . but we're the best lighted city in the world, according to General Electric Co, and we don't have any crime."—*John Fournier.*

U.S. to Study International A-Power

Robert McKinney, newspaper editor, is named to head reappraisal group, which will explore U.S. programs and policies on bilateral agreements with other countries' atomic agencies

The Congressional Joint Committee on Atomic Energy is undertaking a broad study and investigation of U. S. international policies and programs to develop the peaceful atom.

Robert McKinney, editor and publisher, Santa Fe New Mexican, has been appointed to head up the analysis. In announcing the McKinney appointment, Sen Clinton P. Anderson, JCAE chairman, sketched the general area which the special study will take.

"I believe the time is appropriate for reappraisal of our various international atomic energy programs and policies," Anderson said. "The U. S. is cooperating with the International Atomic Energy Agency, Euratom, the newly formed Inter-American Nuclear Commission, and with 40 other individual countries, by means of individual agreements for cooperation. I hope the study will evaluate the purposes and accomplishments, or failures, under all of these programs."

The study will be staffed by personnel from the Atomic Energy Commission, Department of State and JCAE. An AEC outline submitted by McCone in response to JCAE's request to cooperate, suggested, as scope of the study, U. S. bilateral agreements with other countries, the International Atomic Energy Agency and U. S.-Euratom relationships.

As for the Euratom program, it never has really gotten off the ground.

By the Oct. 20 deadline set for European firms to submit proposals for cooperative construction of large nuclear power plants, Euratom had received only two firm proposals. And one of these was not fully responsive to the invitation specifications.

Proposal submitted by Italy's SENN (Societa Elettronuclear Nazional) was on firm ground and has already been approved for a $40-million loan by the World Bank. The SENN proposal calls for the construction of Punta Fiuma in southern Italy of a 150-mw boiling water reactor to be supplied by General Electric Co, with Ebasco Services, Inc, as plant engineer.

Not so firm was the proposal submitted by Germany's AKS (Arbeitsgemeinschaft Kernkraftewerk Stuttgart), a group of six German utilities, interested in building a 150-Mw organic moderated reactor with North American Aviation and its European affiliate, Interatom. The proposal expressed intent rather than firm commitments, indicating they still had some serious reservations over going full steam ahead on reactor construction.

No announcement has been made by AEC or Euratom concerning response to Oct. 20 deadline for proposals, apparently, as officials hint, because the number of proposals was so disappointing.

Passamaquoddy Feasible for U.S., Engineers Say

Tidal plant and proposed hydro project could provide 550 Mw of firm power, they find, for total cost of $687 million. Power cost for U. S. would be 8.4 mills; for Canada, 11.5

An engineering study team has reported to the International Joint Commission on U. S.-Canadian Waters that a Passamaquoddy tidal power project would be economically justified for the U. S. Members of the IJC will explore the engineers' recommendations about the end of 1959. The agency then will turn its evaluation over to the governments of the two countries for possible action.

The study group believes that the project is feasible if tied in with a proposed hydro plant on the upper St. John River in Maine. Cost of the dual development would total $687 million, including interest during the construction period.

The two projects could provide dependable capacity of 550 Mw and an average of 3,063-million kwhr a year, the engineers' report said.

U. S. Ratio 1.31 to 1

In determining benefit-cost ratios, the engineers used a 2½% interest rate for the U. S. and a 4⅛% rate for Canada. Using the dual projects as an example, the study group estimated a 50-year benefit-cost ratio of 1.31 to 1 for the U. S. and 0.58 to 1 for Canada. With a 50-year amortization period, power cost in the U. S. would be 8.4 mills per kwhr and 11.5 mills in Canada.

Over a 75-year life, the project's benefit-cost ratio is set at 1.53 to 1 in the U. S. and 0.63 in Canada. Respective power costs would be 7.82 and 10.6 mills per kwhr, the report said.

The study indicated that the Maine-New Brunswick area's demands for power could by 1980 absorb the output of the dual development.

The idea of harnessing the 18-ft tidal range of the 100-sq mile Passamaquoddy Bay as a high pool and the 27-sq mile Cobscook Bay as a low pool traces back to Dexter P. Cooper, an engineer from Maine, who suggested the scheme in 1919. Under the Federal Emergency Relief Appropriations Act, $7 million was spent in 1935 on starting a strictly U. S. project, but additional appropriations were denied.

Priest Rapids on the Line 16 Months Ahead of Schedule

After a slight delay caused by a dropped wrench, which was recovered after dismantling the first 83-Mw turbine generator, the Priest Rapids Dam's first power was produced Oct. 19. The Grant County (Wash.) Public Utility District project is 16 months ahead of schedule and the fast pace is expected to save $3 million by reducing the estimated $166 million total cost on which the PUD would have to pay interest. Merritt-Chapman & Scott Corp is constructing the Columbia River dam under a $98-million contract. Now about 85% completed, the project will produce 788,500 kw ultimately from ten turbine generators supplied by English Electric Co. Harza Engineering Co of Chicago is serving as supervising construction engineers for the PUD. The agency also is constructing 562,500-kw Wanapum Dam upstream from Priest Rapids.

$55-Million Stock Sale Made by American EP

A record-breaking sale of common stock has produced $55,512,000 to pay off American Electric Power Co's notes and short term bank loans. In the company's first stock sale since 1953, 1.2 million shares were purchased by an investment syndicate for a $46.26-per-share price.

The financing is the largest sale of stock ever carried out by an electric utility holding company, AEP noted. The sale raised the company's total number of common shares to 21,369,889.

'Sparking the Sixties' Is Electrical Week Theme

The National Electrical Week Committee has picked a theme pegged to the "golden Sixties" as a focal point for the weekly observance next February. The theme "Electricity Sparks the Sixties" will emphasize predictions for economic and industrial advances, as well as the products and progress expected within the electrical industry.

The committee last week began mailing 5,700 planning guides to the industry and the press. Fifty big national advertisers will salute the week. The industry's own advertising, promotion and public relations associations will lend their support also. A national Electrical Exposition in Miami will provide a special plug Nov. 9-11.

Turbine Prices Cut 5% By General Electric

A 5% reduction of published prices on steam turbine-generators of 60 Mw and up has been made by General Electric Co. Spokesman for Westinghouse Electric Corp and Allis-Chalmers Mfg Co said their firms are "remaining competitive."

The GE cut follows by four months a $1-to-$4 reduction on units of 200 Mw and up. The latest action reflects "competive conditions in the market place," GE said, and is not a result of lower costs. The 5% decrease may be followed by others in what one GE spokesman describes as a long-term trend to lower prices brought about by lower production costs.

GE said that utility orders for the larger units are coming in at a rate about five times better than last year, a period that was "one of the worst order years in history," a company spokesman said.

The most recent reduction reflects domestic competition, GE added, and would have the effect of stabilizing prices.

FPC Postpones Hearings On ECAP 'til Nov. 23

The long-delayed FPC examiner's hearing on the alleged "political nature" of nine advertisements in a 1957 Electric Companies Advertising Program (ECAP) series has been postponed still another month, till Nov. 23.

This delay as requested by attorneys for the 76 power companies who contributed to the ECAP ad series on "public-vs-private power." These attorneys, chiefly Reid & Priest, claim they are simply overwhelmed by the paperwork necessary to present their case.

The FPC first ordered a hearing on the ads in August, 1958, but a subsequent delay was granted until the full commission could rule on the type of evidence to be allowed: the companies ill-fated request that the ads should be justified as a reasonable business expense, or the FPC staff's successful demand that testimony be limited to a determination on whether the ads are "political."

The ultimate outcome of the case will decide whether such ads can continue to be charged as business expenses, or whether they must be accounted for in a new category "below the line," that is, charged against stockholders earnings rather than customers' bills.

New Computer Aids Biggest Load-Flow Study

Sponsoring companies of OVEC evaluate operations for 2,000-Mw AEC load on IBM's '709' machine in ten hours

Engineers from 15 power companies converged on Arlington, Va., in late October to conduct the largest load-flow study ever undertaken.

These companies are all sponsors of the Ohio Valley Electric Corp (OVEC)—set up to supply power to the Atomic Energy Commission's plant at Portsmouth, Ohio. The purpose of this study was to evaluate the 15 companies' load-flow operations in supplying the AEC plant along with their regular customers, under varying conditions, in eight states.

They came to Arlington because of the availability of a new IBM "709" computing machine in the CEIR (Corporation for Economic & Industrial Research) research center.

Although this study was the largest of its kind ever conducted, it was not intended as a "planning study." That is, it was not aimed at changing or revising existing company flow operations. OVEC tries to conduct a load-flow study on the average of once a year, or whenever any of its sponsoring companies put a major new generating unit on the line.

Study Is Five Times Faster

Use of the 709 computer permitted this study to be completed five times faster than with earlier equipment. Total computing time was about ten hours.

Chances are good that the group will come again to Arlington for its next flow study, unless CEIR's New York office installs a still-later computer model "7090" (transistorized). Then the question of transportation to either New York or Arlington would be controlling. OVEC's sponsors feel their use of CEIR's Arlington computing center is the "best arrangement" for such a study at this time, because no single utility could afford to rent all the necessary equipment used for a full day to conduct the study.

OVEC currently supplies 1,950,000 kw of power—at a 98-99% load factor—to the AEC plant near Portsmouth. The system operates two steam generating plants: Kyger Creek with five 215,000 kw units: Clifty Creek with six 215,000 kw units. The rest of its power requirements are purchased from its 15 sponsors: Appalachian Electric Power, Cincinnati Gas & Electric, Columbus & Southern Ohio Electric, Dayton Power & Light, Indiana & Michigan Electric, Kentucky Utilities, Louisville Gas & Electric, Monongahela Power, Ohio Edison, Ohio Power, Pennsylvania Power, Potomac Edison, Southern Indiana Gas & Electric, Toledo Edison, West Penn Power.

The study revealed that OVEC and its sponsor companies could continue supplying up to 2-million kw to the Portsmouth plant, plus handling their own regular commercial, industrial and residential customers, in spite of "any conceivable outage." OVEC has supplied more power to the AEC plant in previous years, but the total loads of its sponsors has grown faster than this reduction, thereby making this study the largest yet.

One reason for the study—in addition to the one-year interval—was the completion of a new 450,000-kw steam generating unit at Appalachian Power's Philip Sporn plant at Graham, W. Va.

The 15 companies serve customers in eight states: Michigan, Indiana, Ohio, Kentucky, Tennessee, Pennsylvania, West Virginia and Virginia. The flow study, however, involved 333 power stations and 532 transmission lines—the entire OVEC network, its 15 sponsoring companies, plus all the interconnected adjoining power systems.

ICC Expected to Uphold Coal Rate Cut

Electric utilities in the New York area must now sit back and wait for an Interstate Commerce Commission ruling to learn whether last spring's 75¢-per-ton reduction in coal rates is allowed to stand.

Chances are good that the ICC will uphold the coal rate cuts, thereby setting up a precedent for annual bargaining between coal and rate companies on the one hand, and utilities on the other, in an attempt to meet the going rate for residual fuel oil.

As hearings on the recent coal price reductions came to a close last week, Executive Secretary Harry Hilts, Empire State Petroleum Assn, criticized the coal rate cuts for "unfairly" forcing down the price of residual fuel oil—to meet the competition — thereby driving up the price of higher-grade petroleum products to make up for the loss.

Hilts denied earlier charges that lower coal rates were necessary to meet increasing competition from "dumping" of foreign residual oil in eastern ports. It would take 40-million bbl of residual oil to supplant the 9.4-million tons of soft coal now sold in Atlantic Seaboard markets open to either coal or fuel oil, he pointed out, and it would be "absurd" to think this much oil could be obtained from either domestic or foreign sources.

If domestic refiners were to produce the added 40-million bbl of residual, the U. S. market would also be swamped with 360-million barrels of high-grade products (gasoline, etc.), which would make "fair prices impossible."

Foreign imports couldn't bring in 40-million barrels more of residual oil either, Hilts continued, since import quotas would prohibit it, and shipping is also inadequate.

Coal witnesses repeated their defense of the reduced rates to meet increased fuel oil price competition. George Lam, manager of Consolidation Coal Co, said the excess of foreign crude oil would make cuts offered to big coal users (above 5.5-million tons yearly) essential "for the indefinite future . . . maybe several years."

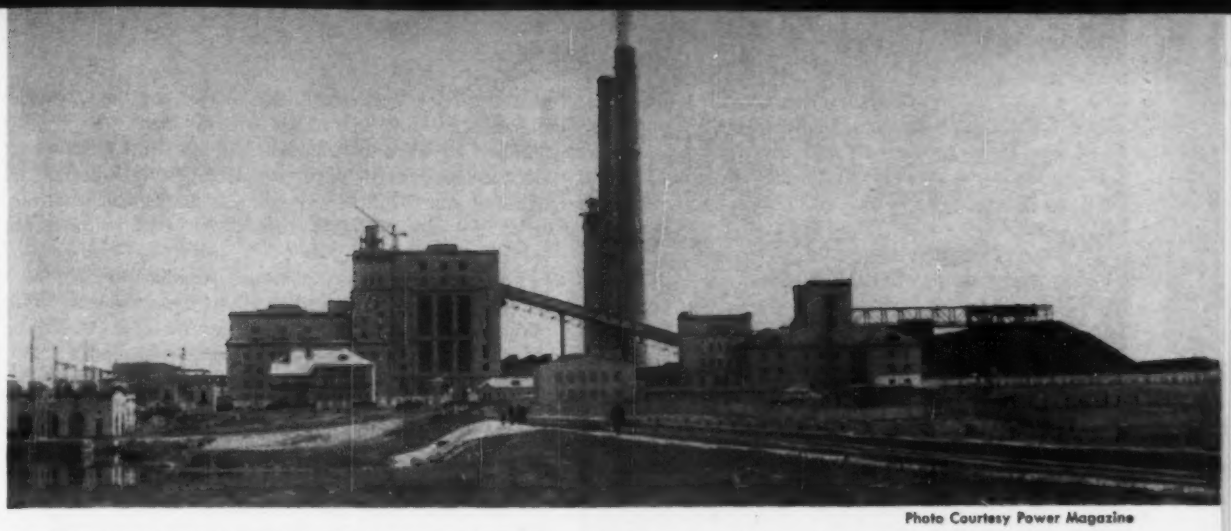


Photo Courtesy Power Magazine

CHEREPETS STATION, begun in 1953, will reach 1,000 Mw by 1960. Located atop the Tula coal deposit it burns low-grade coal having 5,000 Btu per lb. Steam is delivered by two 530,000 lb per hr boilers to each 150-Mw turbine. Generators, hydrogen cooled, are rated 167,000 kva, 90% pf, 50 cps. Four units are now in operation, the highest steam conditions employed at Cherepets Station are reported to be 2,560 psi, 1,100 F

A U. S. Utility Executive Evaluates

What Russia's Power Program Means

The Soviet 7-year program of power station expansion in 1959-1965 offers a basis for critically analyzing and comparing Russia's technology and status in power generation with that of the U.S.

PHILIP SPORN, President, American Electric Power Co

Russia's new power program for the seven years 1959-1965, has these essential characteristics. It relies heavily on expanded use of fossil fuels—coal, gas, and oil. It de-emphasizes hydro. It sharply delimits the use of atomic power for the seven-year period. It relies heavily on the exploitation of larger units and larger steam plants than have heretofore been the practice in Russia.

The objectives of the program are impressive. They call for an expansion of power generating facilities to go hand-in-hand with the Communist Party's projected 80% increase in gross national product from 1956 to 1965.

Past experience warns against underestimating the likelihood of achievement of either technical or qualitative goals set by any responsible Soviet ministry.

Outlines of the program are clear. They were fully detailed in an authoritative and revealing statement by I. T. Novikov, USSR Minister of Power Stations, published in the May 1959 issue of *Teploenergetika.* They offer a basis for evaluating Russian technology, techniques, performance and status in electric power generation, compared with the United States, that will be welcomed by all who are interested in electric power.

Russia's power program calls for electric energy generation to reach 500 to 520 billion kwhr or 2.1 to 2.2 times the 1958 level by 1965. In the same seven-year period, between 58 and 60 million kw of new generating capacity will be added. Of this projected new generation 81 to 83% or between 47 and 50 million kw is planned to be thermal. While Soviet electric generation will exceed the 1958 figure by 2.1 to 2.2 times, thermal capacity is expected to increase from 2.3 to 2.4 fold.

Most of this new thermal capacity will be based on natural gas, fuel oil, and low-grade coal. By 1965, 51% of Russian fuel production will be gas and oil, compared to 31% today. But the proportion of coal mined will be reduced from 60% to 43% of total fuel supplies, by 1965.

Although hydro is not given a very significant part in the expansion of generating capacity, it will not be discontinued, by any means. Hydro will be added, Novikov explains, but its selection will follow Premier

Khrushchev's dictum that the choice must be based on "technological and economic calculations which take into account the production and transport facilities of a given territory, the cost and speed of construction, the capital outlay per unit power generated, and the economics of the plants."

To make generation more efficient in the years ahead, the Russian program will develop power stations having capacities of 1,200-1,800 and 2,400 Mw, equipped with turbines and boilers rated 100, 150, 200, and 300 Mw and installed in "boiler-turbine block systems" (single boiler-turbine unit basis). In the previous seven years power stations were built with capacities of 200-600 Mw and equipped with 25, 50, 100 and a few 150-Mw turbines.

The Russian plan calls for 85 condensing electric plants totalling 30 million kw to be under construction by the end of 1965. This includes 42 plants each with a capacity of 500 Mw or more, which will account for 25 million kw. This is over 80% of the 30 million kw called for in the condensing plant program. The remaining 5 million kw is accounted for by 43 other plants.

Among the 42 large plants, some will have ratings exceeding 1 million kw, some exceeding 1½ million kw, and a few exceeding 2 million kw. However, it is obvious from the small difference between the average (close to 600,000 kw) and the minimum (500,000 kw) size that the number of plants with ratings larger than the 600,000 kw average will be limited. According to Novikov, it is expected in the ultimate (evidently sometime after 1965), 11 of these larger plants will have a rating over 1,000,000 kw, 10 over 1,500,000 kw and 7 over 2,000,000 kw.

In today's USSR power plants there are 58 turbine generators rated at 100 Mw and 5 rated 150 Mw. The first 200 Mw unit is being installed in the South Ural Plant. Table I gives the distribution of unit sizes in the projected 25 million kw of condensing turbine capacity covered by the 42 plants rated 500 Mw and larger, to be erected in the seven year period 1959-1965. This tabulation is from one of Novikov's tables.

A considerable portion of the thermal capacity to be built will be new heat-electric generating plants (presumably back pressure turbines) that will supply central heating and industrial process heat. It is also planned to expand a number of existing large heat-electric stations in Moscow, Leningrad, Siberia, the Ukraine and White Russia. These plants will generally utilize 50- and 100-Mw turbines, operating on steam at 1,850 psia and 1,050 F.

The Soviet program calls also for the installation of gas turbines in small and medium capacity generating plants near gas mains. These gas turbines would be rated 25 to 50 Mw. Later units, apparently after 1965, will be as large as 100 Mw. Altogether, it is planned to build up to 25 gas turbine plants, aggregating 600 to 700 Mw. From this it can be inferred that practically all will be single 25-Mw plants with one or two having capacities as high as 50 Mw.

"The seven-year plan," Novikov writes, "calls for a number of nuclear reactors to be built and installed in territories lacking fuel and water resources." Apparently these will be largely prototype reactors, for Novikov points out that they will be of different types to permit selection of the most suitable models. The problem, Novikov observed, is how to reduce the cost of nuclear electric plants. On the solution of this problem, he said, will depend decisions regarding the rate of development and the size of future nuclear reactors for the generation of power.

Comparison with present and past conditions and prospects for electric power in the U.S. will help to put this Russian program in better perspective.

I. Comparison of Expansion Rates and Capacities

Electric utility installed capacity in the US at the end of 1955 stood at over 116 million kw. Capacity at the end of 1959 is indicated at slightly over 159 million kw with a probable capacity at the end of 1962 of over 192 million kw. Taking a seven-year period, 1955-1962, which is close enough to completion that we are dealing with very firm figures, we know that American utilities will have added 76 million kw of capacity. This compares with the Russian projection of 58 to 60 million kw for the seven years 1959-1965.

Total Russian capacity at the end of 1965 will be approximately 120 million kw, according to Novikov.

Table I—Distribution of Turbine Generator Unit Ratings Projected for 42 Steam Power Plants of 500 Mw Capacity and Larger to be Erected in USSR, 1959—1965

Number of Units	Rating of Units Mw	Steam Pressure psia	Steam Temperature F
46	100	1280	995
27	150	1850	1050
38	200	1850	1050
28	300	3420	1075
2	600 (double shaft)	3420	1075

American capacity at the end of 1965 will be 225 million kw, at the present rate of expansion. This assumes the addition of only 33 million kw net in the three years 1963-1965, a figure derived from the average rate of expansion during 1955-1962.

From an energy standpoint American generation of 1,100 billion kwhr in 1965 is the best present projection. This compares with the Russian projection of 500-520 billion kwhr for the same year.

Although Russia's total capacity and energy figures for 1965, as stated by Novikov, are expected to be far below ours, we cannot dismiss these figures without explaining Russia's continuing higher rate of growth. The U. S. has been and is expanding electric generation at the compound rate of 7.2% annually. The Russian rate, 1959-1965, is 10.5%. For 1925 to 1938 the compound annual rate for Russia was 24%. During the past eight years (the next period for which data are available) growth slowed to a compound rate of 12.5%. Thus the 10.5% figure for the period 1959-1965 represents a further slowing down in rate of growth for electric generation. With further years the rate will decline still more. It may very well go down to the historical long-term trend in the U. S. at the compound rate of 7.2% per year.

What the data for Russia means is simply that the big jump from 1925-1938 occurred as Russia got its late start both in industrializing the country and in the accompanying utilization of electric power. As industrialization proceeds and electric utilization goes with it the growth rate curve declines, as we would expect.

Sovfoto

TURBINE HALL OF MIRONOVSKAYA STATION in the Stalino Region. Station supplies power to Donets coal basin. Fuel is tailings and anthracite powder

2. Thermal-electric vs Hydro-Electric Capacity

Russian de-emphasis of hydro-capacity is in line with our own experience. It has been clear for some time that hydro-capacity was bound to play a declining part in the electric energy picture in the U. S. This trend is reflected in projections for the four-year period, 1959-1962. At the end of 1958, hydro capacity accounted for 29.4 million kw or 20.4% of U. S. total installed capacity of 144.2 million kw. During the four-year period 1959-1962, 7.75 million kw or 17.6% of the expected 44 million kw of additions to the country's capacity will be hydro. Russian de-emphasis of hydro is based on the great improvement in the character of the fuel balance of the country and on an attempt to recognize the true cost factors for hydro.

3. Development of Large Size Units

The Russian program calls for the installation of 28 300-Mw units as part of the seven-year expansion program. This is progressive but it is not bold considering the fact that all units are apparently going to be of a single design for a single terminal pressure and temperature. Novikov expects that by the end of 1965 units as large as 500 or 600 Mw will be undertaken. Our experience is that between bold undertakings of this sort and successful performance a time lapse is frequently unavoidable.

Contrasted with this projection is the American record of 31 units to be completed by 1963. A substantial portion of these are already completed and in successful operation. These 31 units have a total rated capacity of over 11,680,000 kw and an average rating exceeding 375,000 kw. They include at least one, and possibly several, units with a rating of 600 Mw.

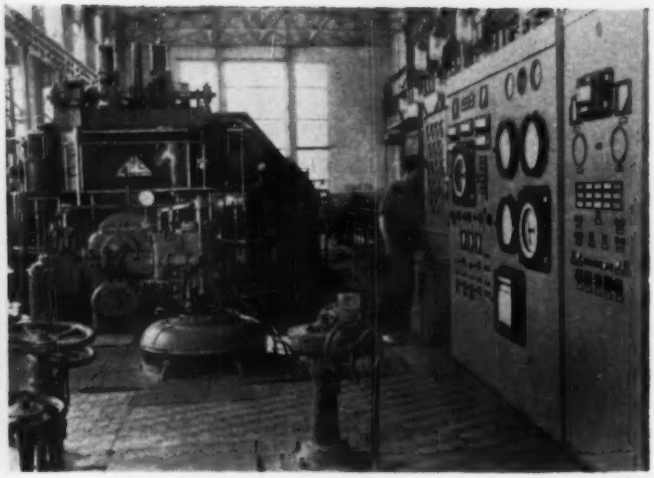
The significant point about this aspect of the Russian program is neither size of unit nor steam temperature, but rather the supercritical pressure of 3,420 psia. Novikov does not disclose what experience is behind Russia's decision to build 28 units in the supercritical pressure range. As against this, American supercritical practice has behind it the considerable experience of Philo No. 6 and will, within the next six months, have the further experience of Eddystone and of Breed Stations.

4. Size of Plants

No specific information is given by Novikov on the number of plants to have a capacity greater than 1,000,000 kw by 1965. But, the number, as previously pointed out, is going to be small. American technology is much more advanced already. At present there are in operation on American power systems five steam-stations with a capacity exceeding 1,000,000 kw. The largest, Kingston, has a capacity of 1,440,000 kw, Shawnee has 1,350,000 kw, and Clifty Creek 1,304,000 kw. By 1963 this number will have grown to 16.

5. The Place of Gas Turbines and Nuclear Plants

The Soviet plans for gas turbines call for a large number of units but add up to only about 1% of the total power program. American use of gas turbines and our plans for future use are even less. We can assume that the same difficulties that have obstructed the development of the gas turbine in the United States also



Sovfoto

FIRST UNIT AT ANGREN STATION in Siberia. Station is the largest in Middle Asia and is reported to have a capacity of 600,000 kw

count heavily against its use in Russia. There, as here, it seems likely that further expansion of gas turbine plants must be awaiting development of an effective and economical method of integrating such units into the steam turbine cycle. This, in turn, is heavily dependent upon the development of a gas turbine capable of utilizing coal.

Judging from Novikov's very general reference to them, nuclear plants will not occupy a place of much importance in the Russian power supply program. In the U. S. every power reactor project under way or presently contemplated is either a prototype or development unit. By 1963 our vigorous program will certainly see all but a few, and perhaps all, of the following reactors in operation:

Shippingport
Dresden
Indian Point
Enrico Fermi
Hallam Nuclear Power
Northern States Power
Yankee Atomic
Big Rock Point
Humboldt Bay
Florida West Coast Nuclear Group
Philadelphia Electric Co
Elk River
City of Piqua
Oak Ridge EGCR
Carolina-Virginia Nuclear Power Assoc

Perhaps there will be a number of others. We can conclude that at least as to scope of our development program, we will not, by 1963, be behind the Russians, though Novikov does not give the details of their program.

6. Outdoor Plants

The current seven-year plan of the USSR calls for construction of several outdoor or semi-outdoor plants. Outdoor and semi-outdoor construction in the U. S. has a long and well-established history of success. It extends back nearly 25 years for boilers, and more than 10 years in the case of full outdoor plants. But the advantages attributed to such plants by Novikov—a reduction in the construction time of from 9 to 12 months, and a reduction in the cost of from 22 to 28% —have not been experienced in this country. It is indeed difficult to imagine what kind of enclosure system could have been employed which when eliminated would reduce construction time by a year and the construction cost by over 25%. That the outdoor or semi-outdoor idea has merit there is no doubt. This is attested by its continual application in the U. S. since it was first begun.

7. Cost of Water Supply System

One of Novikov's most surprising statements is that the water supply system in a number of Soviet plants involved expenditures of from 50 to 70 million rubles —about 30% of the total cost of the plant. Even on such unfavorable and erratic rivers as the Ohio, with a variation in river level ranging up to 65 feet, water system costs on a large number of plants with which the author has had intimate contact, have not exceeded $8.50 per kw. Total water system costs in these cases have included difficult coffer-damming, extensive de-watering systems, substructures, screenhouses, screening, and pumping equipment. At $135 per kw overall cost this amounts to roughly 6½%. In a recent plant (with two 225-Mw units) which required cooling towers, cost of the water system, including the towers, ran $11.50 per kw or 8.5%. It is difficult to imagine the conditions under which 30% of the cost of any modern power plant would be required for the water system.

8. Coal Handling

"The system of handling the fuel in existing electric generating stations is cumbersome, complicated and costly," Novikov observes. He commented further that the rules used heretofore for storing fuel in storerooms and bunkers are unnecessarily strict "and should be revised" and "In storehouses heavy traveling cranes for reloading should be replaced by scrapers and bulldozers." "Unloading sheds should be replaced by proper type of cardumpers." It is surprising to find that storehouses and heavy traveling cranes are items that have to be considered in a program projected for 1959-1965. Replacement of cranes by scrapers and bulldozers and unloading sheds by cardumpers has been accepted American practice for at least 35 years in the case of cardumpers and 25 years in the case of scrapers and bulldozers.

Another interesting feature of Novikov's paper relates to the use of belts, presumably for bringing coal into the plants. He says "In fuel supply systems use must be made of the more efficient belt conveyors with belts of 1,600-1,800-2,000 mm width" (63-71-79 in. wide). Belts have been used for this purpose in American power practice for almost 40 years, and extensive use has been made of wide belts. But if Novikov means to suggest that the entire supply of a power plant involving from 1,200 to 2,000 Mw should be placed on a single 2,000 mm belt, the engineering

judgment reflected is questionable. A much better solution from the standpoint of safety, reliability, and maintenance would be to install two 1,500 mm belts traveling side by side.

9. Construction Time to Put Capacity in Service

Novikov says that preparatory work has an important part in the shortening of the construction time of thermal-electric power plants before the first block can be placed in service. Hitherto, the cost of this work was, he said, up to 25% of the total cost of the construction and lasted for 26-28 months. Changeover to industrial methods of construction and the use of dismountable and portable temporary buildings makes it possible to shorten the time by 8-12 months, it is stated.

Altogether, Novikov says, construction time for large steam plants can be reduced by 12-18 months out of the 45-47 months required heretofore. In gas and fuel oil operated plants it can be reduced by 18-26 months. This is indeed a surprising account of Russian power plant construction practice. Current good American practice, and practice on the system of the author's own company, calls for initial production in new large steam plants in from 24-25 months from the time the first shovelfull of dirt was thrown. Since very little engineering time is used prior to the beginning of construction where time is important—beyond much more than a month—the preparatory work that has been done has in each of these cases amounted to very little.

10. Relative Thermal Efficiencies

"According to preliminary calculations for the planning institute *Teploelectroproyekt* the specific cost of conventional fuel per generated kilowatt-hour (grams of conventional fuel per kwhr) varies with the steam parameters and the type of machine," Novikov states. The variation is shown in Table II, adapted and reproduced here.

Average performance of the last two figures in each of the last three columns is 311 grams per kilowatt-hour. Assuming that the coal used has a heat content of 12,500 Btu per lb this would give a thermal efficiency of 8,550 Btu per kwhr. This is close enough to the expected result on the optimum heat cycle that either of the two largest machines given in Table II could be expected to have. And this is useful in evaluating the disclosures as to existing thermal-electric plant efficiency.

"According to preliminary calculations," Novikov continues, "the specific consumption of fuel in regional electric plants of the Soviet Union per kilowatt-hour delivered at the bus bars must be reduced on an average of from 483 grams in 1958 to 395 grams in 1965. . . ."

This means that the weighted average thermal efficiency for 1958 was 13,300 Btu per kwhr. The weighted average efficiency for all thermal-electric plants in the United States in 1958 was 11,090 Btu per kwhr. The weighted average performance on the American Electric Power system was 9,921 Btu per kwhr. Thus Russian performance was 20% poorer in 1958 than American weighted average performance and 34% poorer than the performance on the American Electric Power system.

The performance of 395 grams per kwhr projected for Russian systems in 1965 represents the equivalent of 10,900 Btu per kwhr. This is an improvement at the average rate of 342 Btu per year which will be a very impressive result when attained. Even at that it would, seven years later, be only about 1.7% better than the average American performance in 1958, and 10% less efficient than the American Electric Power system's actual performance in 1958.

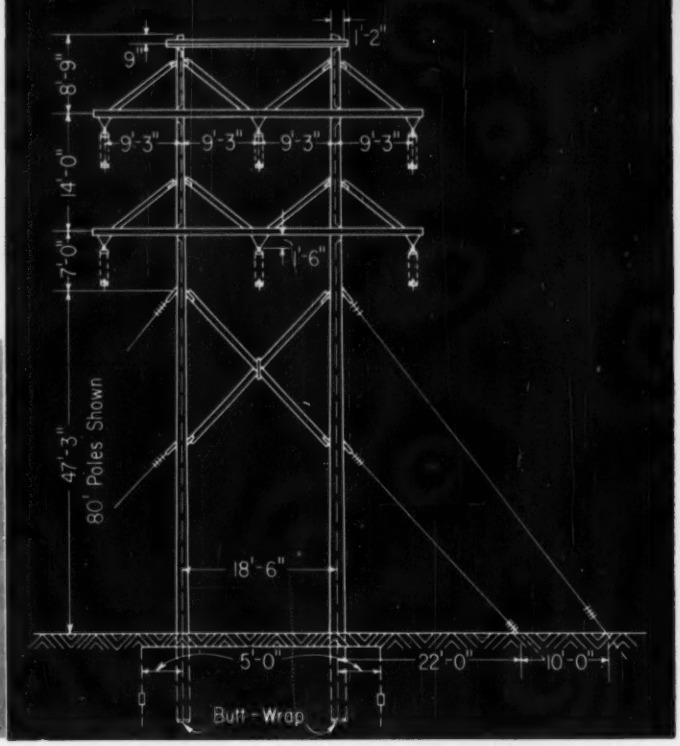
These performance comparisons are based on the determination of the Btu equivalent of a "gram of conventional fuel." The assumed value of 12,500 Btu per lb or 27.5 Btu per "gram of conventional fuel" correlates with the performance figures in Table II if the last two cycles are assumed to use two stages of reheating. If they are in fact single reheat then the apparent heat content of the "gram of conventional fuel" would be higher and all Russian performance figures discussed above would be poorer than indicated by 2%.

Table II—Thermal Performance of Russian Machines of Various Sizes and Types

Type of Unit	Steam Pressure—psia and Temperature—F	Grams of Fuel per Kwhr For Hours in Service		
		5,000	6,000	7,000
VPT-50	1,280/932	404	395	390
PVK-100	1,850/1050	355	348	345
PVK-150	1,850/1050	350	343	340
PVK-200	1,850/1050	346	339	336
SVK-300	3,420/1075	318	313	308
SVK-600	3,420/1075	315	308	305

115-Kv Tangent Structure

Conductor – 636,000 cm 26/7 ACSR
Shield Wires – 134,000 cm 12/7 ACSR
Insulators – Eight 5¾ x 10-in. units
Poles – Class 1, Western Fir
Crossarms – 3¾ x 9½-in. x 39-ft Dbl. Plank Arm
Guys – 7/16-in. H.S. Galv. Steel
Anchors – 15-in. Screw
Maximum Span – 700 Ft
Ground Rods – 3⅝-in. x 10-ft Sectional CW



TANGENT STRUCTURES for 115-kv double-circuit line are of standard H-frame design; angles and deadends are double-circuit steel towers

Full Scale Tests Prove And Improve

Structures designed against wind of 135 mph exceed design expectations under full scale tests on 115-Kv tangent structure

GEORGE J. MOORE, Electrical Engineer, Black & Veatch, Consulting Engineers, Kansas City, Missouri

Orlando Utilities Commission will this year complete construction of a 33-mile 115-kv double-circuit wood pole H-frame line linking its Indian River plant to the 115-kv loop around Orlando, Florida.

The line is being built across an area subjected to hurricane winds and where soil conditions vary from dry pasture land to muck-filled swamps. Every attempt was made to design as rugged a structure as possible consistent with the dictates of economy.

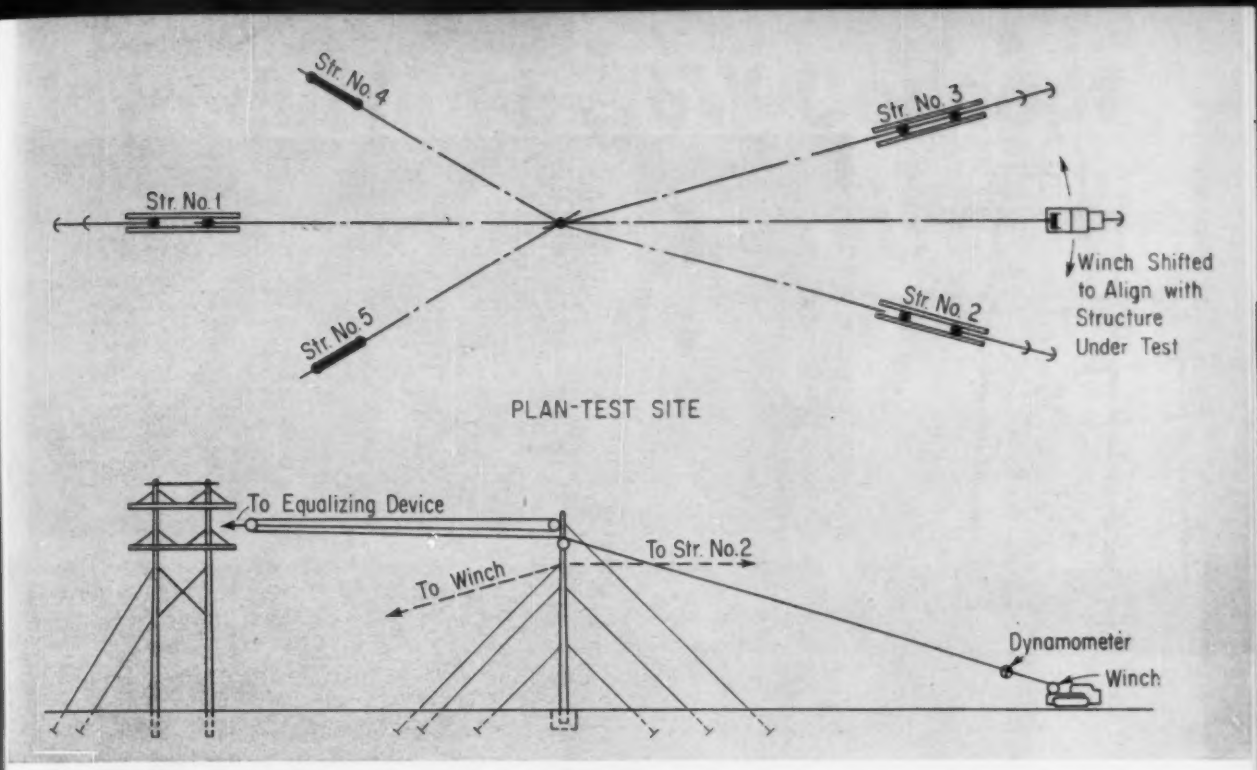
- Wood structures will be used for tangent structures only.
- Angles and dead ends will be made with double-circuit steel towers because of right-of-way restrictions, the small number of line angles, and the problems associated with guying double-circuit corners.
- Tangent structures will be of standard H-frame configuration.
- Spiked grid-gains will be used at all arm and brace connections.
- Shear plates will be recessed in the crossarms at all pole connections. Maximum bolt size will be ⅞ in.
- All structures will be side-guyed from both the top and bottom X-brace connections.
- Transverse load on the structure will be approximately 18,000 lb, assuming a 675-ft span and 135-mph (actual) wind or 45.6-psf pressure (cylindrical surfaces).

Because of the exacting requirements for the line, the indeterminate nature of certain calculated stresses in wood structures, the unknown performance of certain structure connections, and the questionable values to be expected from the soil both in thrust and uplift, full structure field tests were made. The tests were aimed at proving and improving structure designs.

Tests Evaluate Five Points of Interest

The tests were developed to evaluate several points of primary interest:

1. Ability of the structure to withstand a transverse loading of 27,000 lb (1.5 times 135-mph wind), without failure or excessive deformation of any component.
2. Holding power of anchors.
3. Division of load among side guys in different combinations.



TEST STRUCTURES were spotted around central pulling structure, with a winch position for each structure. Field testing was prompted by factors including requirements of the line and unknown performance of some connections

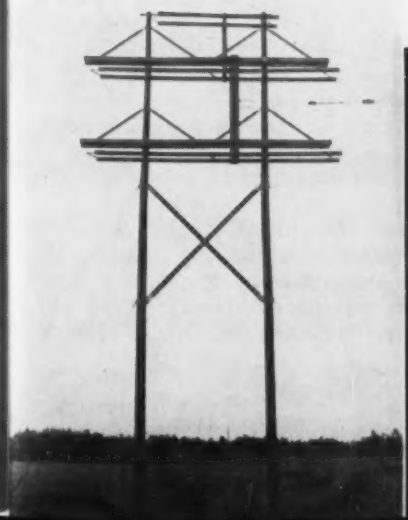
H-Frame Design for Hurricane Area

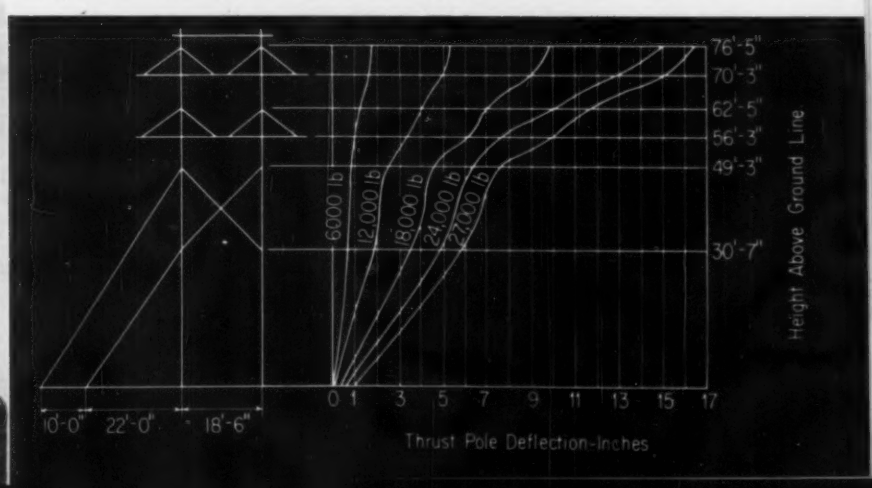
4. Permissible loading with and without uplift and/or bearing plates and the performance of different designs of these plates.

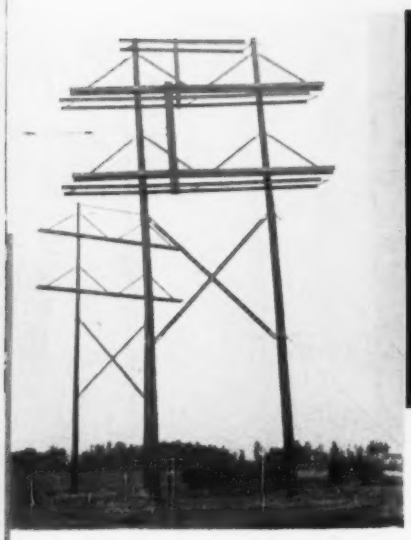
5. Problems of framing and setting the structure.

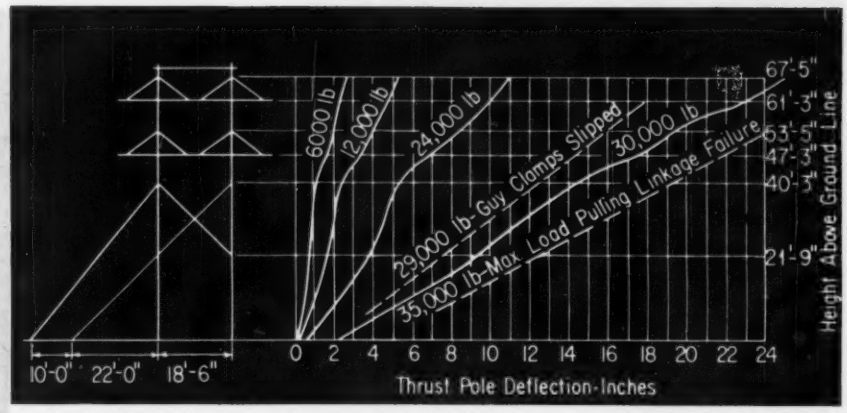
Structures were framed on the ground and set up around a central pulling structure that consisted of a well-guyed 70-ft Class 1 pole set on a concrete pad. Loading at the individual static and conductor positions was simulated by an equalizing device that allowed the application of a composite load at one pull point on the structure. Load applied to the structure was measured by a dynamometer and an electrical strain gauge in the pulling linkage. Strain gauges were also used to measure guy tensions. Structure deflections.

FIRST TEST was on 90 ft Class 1 pole structure having four steel guys each to top and bottom X-brace points. This structure was tested to 27,000-lb load









FOURTH TEST was made on structure having two guys and two anchors at upper and lower braces. Structure took load up to 29,000 lb when guy clips slipped. With one more clip on each guy, structure tested to 35,000 lb, when pulling linkage failed. No structure parts, inspection showed, had suffered excessive distortion

thrust and uplift were read through transits and levels from scales nailed to the structure.

The first test was made on a structure of 90 ft Class 1 poles with four $\frac{7}{16}$-in., high strength steel guys and four 15-in. screw anchors with 8-ft rods. Combination uplift-bearing plates were installed on the pole butts. The structure was loaded to 27,000 lb in five steps. It withstood the load with no noticeable defects. Thrust and uplift poles moved less than ¼ in.

The second test was like the first except that crossarm pole bolts were loosened ⅛ in. to simulate wood shrinkage. There was little difference in the deflections compared with those in the first test.

The third test was made on a structure having 80-ft Class 1 poles with the anchor and guy arrangement the same in the previous two tests. A pole anchor was used on the thrust pole but it was not effective. The structure was loaded to 27,000 lb. Results were much the same as in the first test. Tensions in guys from the upper X-brace point were slightly higher than those from the lower X-brace point. The thrust pole moved $\frac{1}{16}$ in. The uplift pole remained stationary.

Two Guys, Two Anchors Used

For the fourth test framing of the structure was the same as it was for Test No. 3 except that two guys and two anchors were used instead of four each at the upper and lower brace points. The structure was loaded to 24,000 lb with no apparent damage. Anchors were holding properly and tensions in the guys were approximately the same. But when loading was increased to 29,000 lb the guy clips slipped.

An additional clip was installed on each guy, the structure was straightened and the test was continued with the thought that it would be taken to failure. At 35,000-lb load the guy attachments on the pulling pole failed and the test was discontinued. Inspection showed that none of the structure parts had suffered excessive distortion.

Additional tests were made on short X-braced structures (Nos. 3, 4, & 5) to test various anchoring combinations as well as the performance of structures with different backfill.

Seven Conclusions Drawn from Tests

The following conclusions were reached:

1. Strength of the composite structure exceeded design expectations. New structures can be expected to withstand transverse loads of 135-mph winds with factor of safety of 1.5.
2. Fifteen-inch screw anchors proved to be adequate for the maximum loads imposed during test.
3. The need for additional guy clips was established.
4. Soil performed better in uplift and bearing than was expected. Maximum thrust and uplift was less than 1 in. Bearing and/or uplift plates will not be required unless exceptional conditions are found in certain areas.
5. Certain small errors were found in the framing of the test structures.
6. It was found that it is practical to frame structures on the ground and erect them as a unit even though poles must be jetted. Component parts are not loosened by the jetting method of installing structures.
7. Better results would have been obtained on all tests had the structures been set three to four weeks before the tests. In no case had the test structures been installed more than four days prior to the test.

These tests were conducted in Orlando, under the supervision of engineers from Hughes Brothers, Inc, Seward, Nebraska, manufacturers of the basic structure on this project, and Black & Veatch, Kansas City, Missouri, consulting engineers for Orlando Utilities Commission.

Introducing a NEW Concept In Power Transformers

Expanded Preferred Design Program

Includes: AN ATTACK ON INFLATION
SUPERIOR FEATURES
ADDITIONAL RATINGS

GENERAL ELECTRIC

Progress that Pays Off

NEW Preferred Design

Achieving an Industry Goal . . . A Better, More Economical Transformer

J. W. SEAMAN, General Manager — Power Transformer Department General Electric Co.

My associates and I would like to discuss a revolution in power transformer design and manufacture. A revolution that can help electric utilities meet the pressing challenge of inflation and, at the same time, provide improved units.

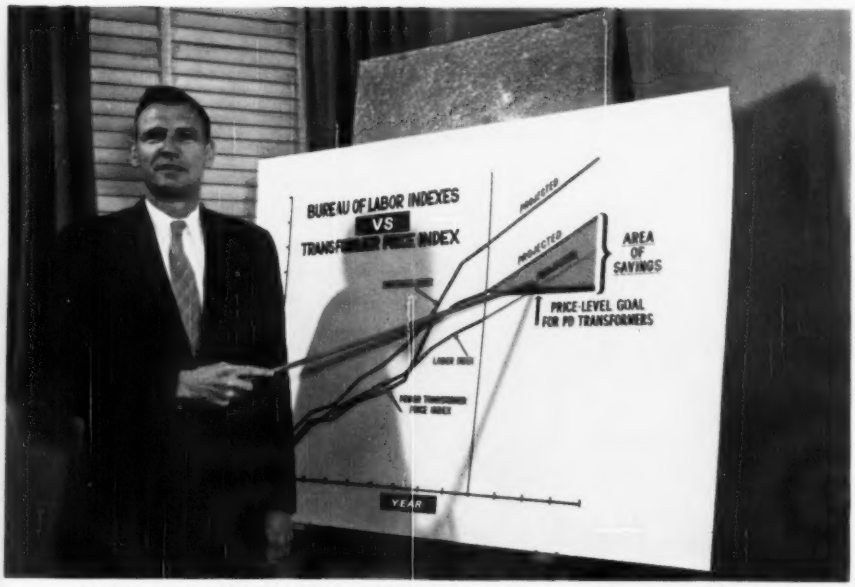
In 1957, we took the first step in meeting this challenge by introducing Preferred Design transformers — units with uniform features and accessories but complete electrical flexibility. Now all the people and facilities at our Pittsfield, Massachusetts power transformer plant are involved in a sweeping expansion of the original PD concept.

This new PD program meets these tests of a valid new business approach for power transformers: It is a strong force to combat the continuing inflationary trend; it incorporates user-preferred features; it embodies extreme product simplification while providing for continual product progress.

Uniformity of design and manufacture is basic in the Preferred Design program. Manufacturing economies will result from the conversion of our factory from a job shop to a mechanized production facility. Since these economies will be passed on to utilities, the program warrants the consideration and support of the electric utility industry.

Now my associates will outline our expanded Preferred Design program in more detail . . .

". . . net published prices should remain near present levels . . ."



YOUR 1959 PURCHASING POWER for power transformers can be retained or bettered, depending on the trend of inflation and utility support of Preferred Design.

C. T. KASTNER, Manager — Marketing

In spite of continually rising labor and material costs, we haven't increased net published prices since mid-1957. And if the electric utility industry provides volume support for the PD program and inflation continues at the current rate, our net published prices should remain near their present levels for at least the next several years.

More immediately, based on acceptance of PD to date, we have realigned our pricing structure because our new manufacturing system obsoletes many previous price relationships. While there are some increases, the majority of net published prices have been decreased. Considering the entire Preferred Design line, a more-than-five percent downward adjustment is now in effect.

GENERAL ELECTRIC

n, a Valuable Hedge Against Inflation

"... substations built or uprated ... faster, more simply and economically."

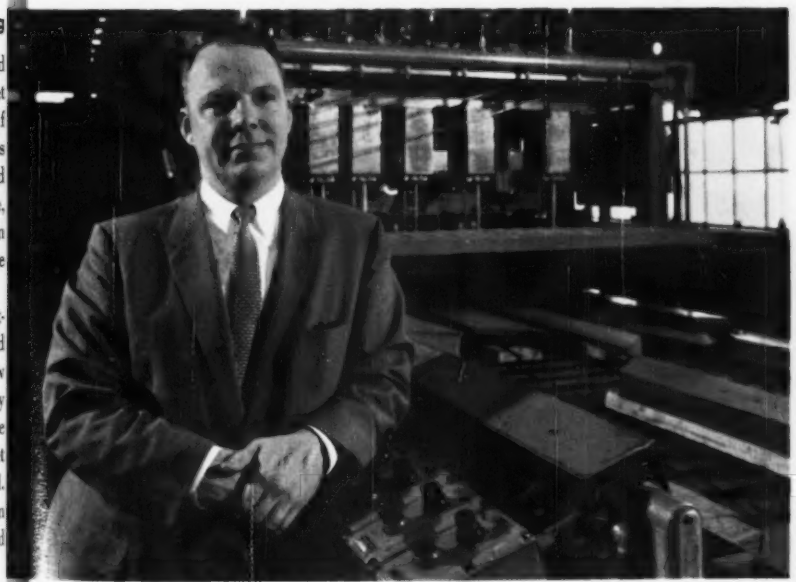
SIMPLE, ECONOMICAL UPRATING results because *all* General Electric Preferred Design power transformers can be fitted with U-connectors and radiators for light loading or uprated to maximum capacity through addition of fans and pumps.

L. WETHERILL, Manager—Engineering

Utility engineering and operating personnel will find many PD assists when substations are built or uprated. The advantages of "construction-approved" proposition drawings, uniform mechanical features and accessories, 40 percent faster deliveries, optimum designs and the ability to uprate new PD units mean substation work can be done faster, more simply and economically.

Previously, the choice of cooling method entered into a particular unit's design. No more. Now cooling is relegated to its proper place as an accessory. PD transformers will accept any of the interchangeable cooling packages. For example, when serving a growing load, the capacity of every OA// unit can be increased 67 percent with only about five percent added investment.

"... cost-saving steps toward mechanization paralleled by product improvements."



CONTINUOUS ANNEALING OF CORE STEEL has helped make PD unit more efficient; typifies Preferred Design emphasis on better methods for better quality.

P. H. ALSPACH, Manager — Manufacturing

The uniform shape and arrangement of PD components permits greater use of mechanization, sub-assembly work and repetitive manufacturing operations. We are converting from an in-series job shop operation to parallel manufacturing in product-oriented production areas. One example: the new cooling concept has helped the development of one basic tank which only now can be assembled on a single, efficient line, independent of other components.

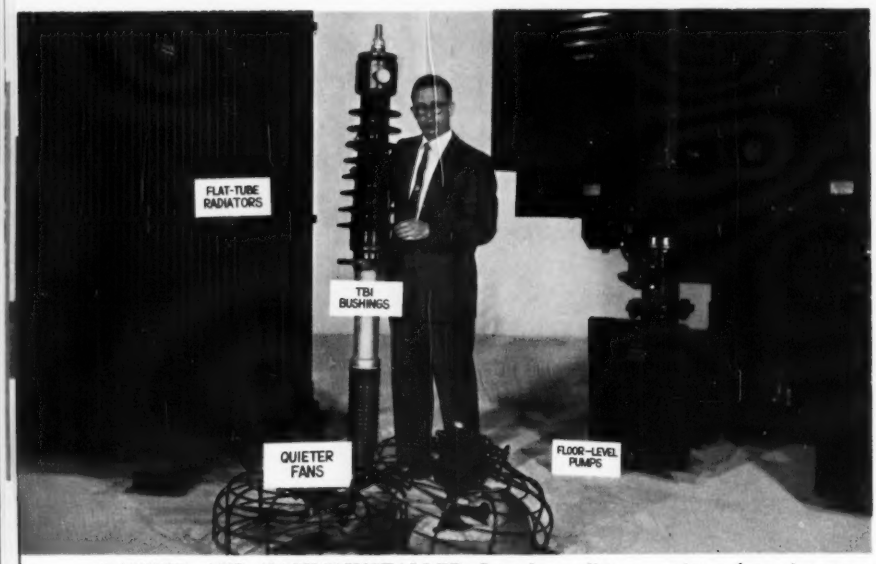
This is our key to holding the line on prices. At the same time, methods have been adopted to improve quality and shorten time cycles. Result of these manufacturing advances: cost-saving steps toward mechanization paralleled by product improvements.

GENERAL ELECTRIC

Progress that Pays Off

More Ways NEW Preferred Design will benefit electric utilities . . .

". . . many previously optional features . . . automatically supplied without charge."



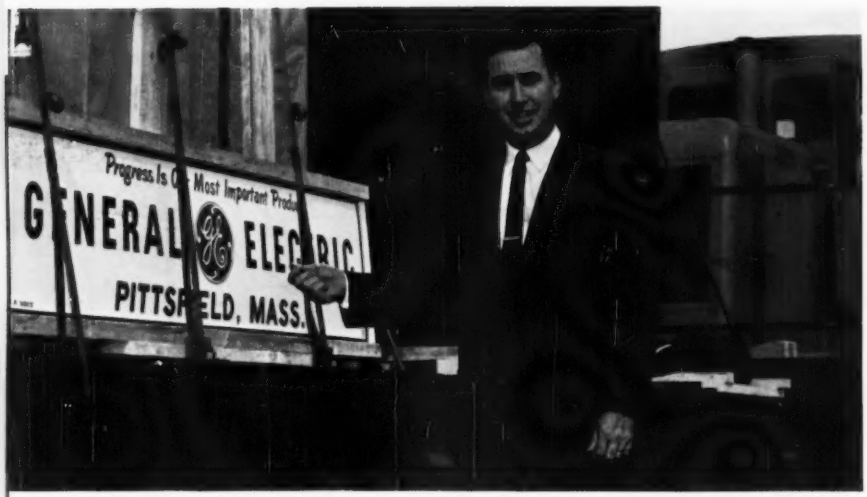
BANKED AND EASILY-INSTALLED flat-tube radiators, quieter fans, inventory reducing TBI* bushings and more accessible floor-level pumps typify the many new Preferred Design transformer features. *Trademark of the General Electric Co.

L. H. HILL, Product Planning Engineer

Preferred Design transformers reflect the needs and desires of the large majority of utilities as best we could determine them. Through surveys, interviews and analysis of orders and specifications, the uniform features and accessories which were chosen are truly utility-preferred.

To further product uniformity, many previously optional features are now automatically supplied without charge. These include provision for lightning arresters, additional CT's and protective relays. The ability to uprate a unit is now inherent in each PD unit — for example, on an OA unit we supply conduit for future use and TBI bushings suitable for the maximum rating. Our criteria is to provide as standard any item needed for later uprating which is more easily installed in our factory than in the field.

Given necessary support . . . "We are ready to pay off . . ."



IT HINGES ON YOU. We will pay off with improved transformers and a hedge against inflation if you provide volume support of extended Preferred Design.

C. B. FAUBION, Manager — Power Transformer Sales

Preferred Design is a major example of progress in power transformers that pays off.

In the expanded PD program, we offer superior transformers, faster deliveries and time- and money-saving benefits in your planning, engineering, and operating work. On top of this, we want to help you fight inflation. We are ready to pay off if you accept the industry-preferred features and provide the volume support we need.

For a more complete story, contact your G-E Apparatus Sales Office or request GEA-6604 from General Electric Co., Section 421-59, Schenectady 5, N. Y.

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POWERCASTING IS NEEDED to meet the expected quadrupling of energy needs during the next 20 years, says Dr. J. A. Hutcheson, Westinghouse

NEW-CONCEPT UNITS are designed specifically to meet peaking, spinning reserve or base-load needs, says W. S. Ginn, General Electric

Two Approaches to Generation Planning . . .

. . . are aimed at developing the most-economical pattern of expansion, SEE engineering and operation meeting told

The most economical pattern of generation expansion may lie in two new approaches — "new-concept" generating units and "powercasting" —presented to the industry at the conference of the Engineering and Operation Section of Southeastern Electric Exchange in Atlanta, Oct. 15-16. Other highlights of the engineering meeting were the outlining of five major industry problems and a progress report on use of capacitors to lower power transformer BIL's.

"The challenge facing the electric utility industry today," said W. S. Ginn, General Electric Co, "is to keep the cost of power low." To meet this challenge the utilities must apply "new-concept" generating units which now are available. Ginn enumerated these new-concept units, each designed specifically to meet certain portions of load requirements with optimum economy, as:

- Gas-turbine units for high peak loads lasting only a few hundred hours per year.
- Spinning-reserve steam-turbine units for those loads between short-time peaks and base-load operation.
- Conventional, high-efficiency steam-turbine units for base-load operation.

Peaking gas turbines can be installed for $110-$120 per kw that have very low operating costs but lower efficiencies. Spinning-reserve units can be made to deliver 30%-40% more output than the maximum efficiency base-load units but with a 15%-20% poorer heat rate. The over-capacity characteristics of such units must be matched with boiler and station auxiliary over-capacity reserve. Capital costs of spinning-reserve machines rule against their use for peak loads alone. The base-load, high-efficiency units are the conventional machines that have been applied to utility systems over the years.

Challenge to Manufacturers

The challenge to the steam-cycle equipment manufacturer, said Ginn, is to reduce the cost of using higher temperatures and pressures. Of the many thermal cycles investigated, only the coal-fired, combined steam-gas turbine cycle offers real promise as an economical competitor to conventional cycles.

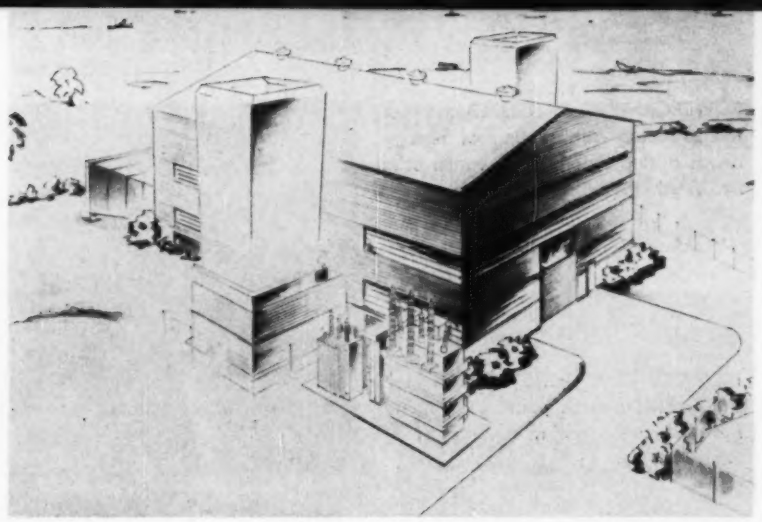
Dr. J. A. Hutcheson, Westinghouse Electric Corp, stated that installed generating capacity will have to be quadrupled in the next 20 years to meet predicted energy requirements. He called for a new concept of planning—"powercasting"—to provide such tremendous expansion economically. Powercasting is the planning of system expansion on a comprehensive and far-sighted basis to encompass all variables and thus reduce the risks of a wrong decision in a continuing expansion program.

It consists of setting up a mathematical model of a complete power system on a digital computer and applying gaming techniques to those probabilistic events such as today's load, forecast error, forced outages, and other events beyond control. The computer compresses 20 years of system operation into less than 20 min. It prints out the expansion program required, present worth of expenditures, total capital requirements, production and operating costs, etc. This new concept of planning puts expansion around kilowatt hours at the point of use and develops systems to get them there, said Dr. Hutcheson (More on powercasting on page 92.).

"Rate of increase in cost of nuclear plants with an increase in size is substantially less than for conventionally-fueled plants," said W. Kenneth Davis, Bechtel Corp. Very serious consideration should be given to nuclear power by any utility which (1) can accept a base-load unit of about 300 (e)Mw; (2) has or can forsee conventional fuel costs of at least 40-45 cents per million Btu; and (3) is interested in obtaining the lowest costs over the lifetime of a new unit.

F. H. Coughlin, President of Southeastern Electric Exchange and also of Central Louisiana Electric Co, said the electric utility industry faces these major problems:

1. A coming demand for perfect-service reliability with closer limits on voltage and frequency.
2. Fully-integrated regional service areas with interconnection to



GAS-TURBINE PLANT consisting of two 20.5-Mw units would cost $5.3 million, a maximum figure covering everything but the land, reported W. D. Marsh

adjoining areas and regions.

3. Possible shortages of fossil fuels.

4. Cost-cutting, to avoid rate increases and worsening of public relations.

5. Recruiting and training people to handle the tremendous engineering and management jobs required in the future.

Miles Cary, Virginia Electric and Power Co, urged that utilities coordinate the operation of their systems and give more study to interconnections. Economic and political factors and system stability requirements make consideration of interconnections essential, he added.

Analysis of the investment and operating costs of gas turbines for peaking service was presented by W. D. Marsh, GE. Fuel cost will vary widely depending on the type used, he said. However, maintenance costs are about 1.5 mills per kwhr for continuous operation at maximum load and 0.5 mills per kwhr if economy loading practices are followed. These costs include all maintenance to keep the unit in reliable operating condition; there are no additional charges for unit overhaul or exchange.

Start-up cost is about $17 based on 70-cents-per-million-Btu fuel. Labor and stand-by costs are nil because gas turbines are adaptable to remote, unattended operation and quick starting and loading from either cold or hot conditions. Rapid start-up can result in important savings in system fuel costs in handling peak loads, Marsh said.

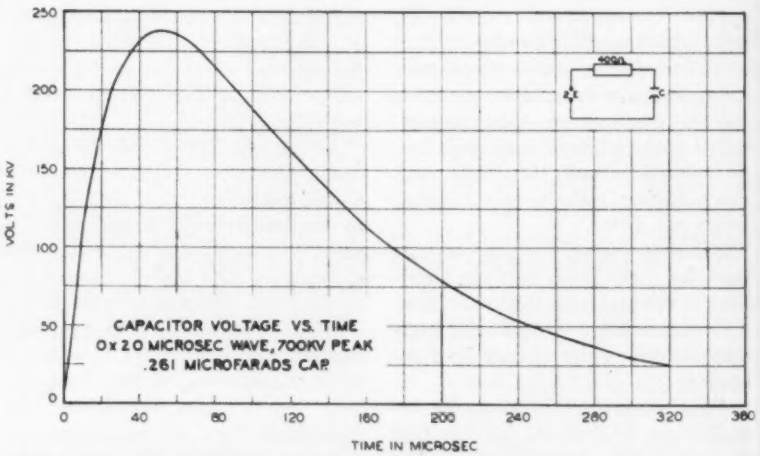
B. C. Mallory, Stone & Webster Engineering Corp, told of some aspects of 1960 steam power station design which appear as major trends or are still considered as controversial. Trends are indicated by the Sabine Station of Gulf States Utilities, which is of outdoor design, has a minimum of structure on three sides with the boiler filling most of the fourth side, minimum ventilation and lighting, and no permanent heating. Sheet steel lagging of the turbine generator is omitted, said Mallory.

Boiler designs are changing radically, with the goal being coal firing at full rating at the minimum current cost. Present design calls for a full-sized boiler-feed pump on the main turbine, with a small motor-driven unit for start-up and standby. "The trend regarding operators might be characterized as toward using one thoroughly trained man rather than two of limited capability and experience", concluded Mallory.

Concerning the effect of transmission losses on economic dispatch, R. O. Usry, Southern Services, Inc, concluded that an economic dispatch computer which gives full consideration to transmission losses will pay for itself in a short time on many systems; result in smaller incremental load changes on a greater number of units; and permit valuable savings when used to study interconnections. Use of the computer also will prevent certain interchanges previously considered economical; result in improved methods and savings in handling economy interchanges; and introduce new problems in developing flexible and equitable interchange contracts. Discussion brought out that the trend in economic dispatch seems to favor the "desired-generation" type of computer over the "cost-of-power-delivered" type.

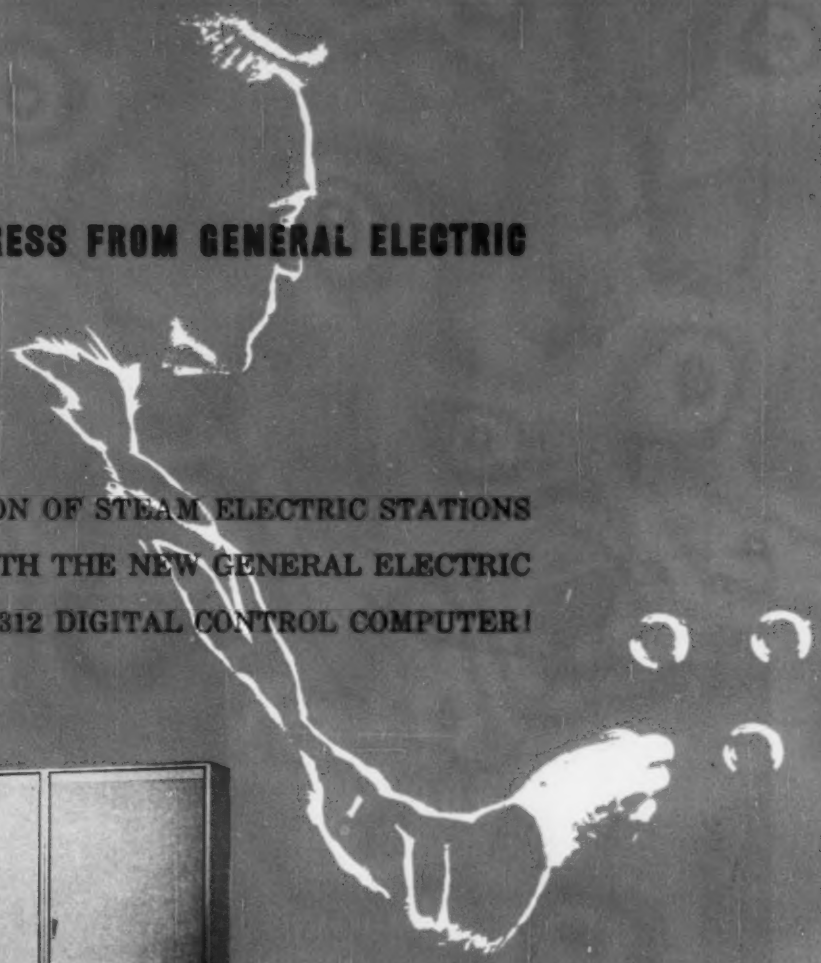
J. W. Keck, Florida Power & Light Co, said that corrosion and deposits may be retarded on the fire-side surfaces of residual-fuel-oil-fired boilers by the spray-coating of in-service boiler surfaces with a calcium oxide and/or magnesium oxide slurry. Spraying of boiler surfaces does not affect the fouling rates of air preheaters and dust col-

(*Continued on page* 136)



VALUE OF CAPACITORS in limiting a 700-kv peak surge was shown in a test installation on a 100-kv bus feeding over 20 miles of line, said H. B. Wolf

COMPUTER PROGRESS FROM GENERAL ELECTRIC



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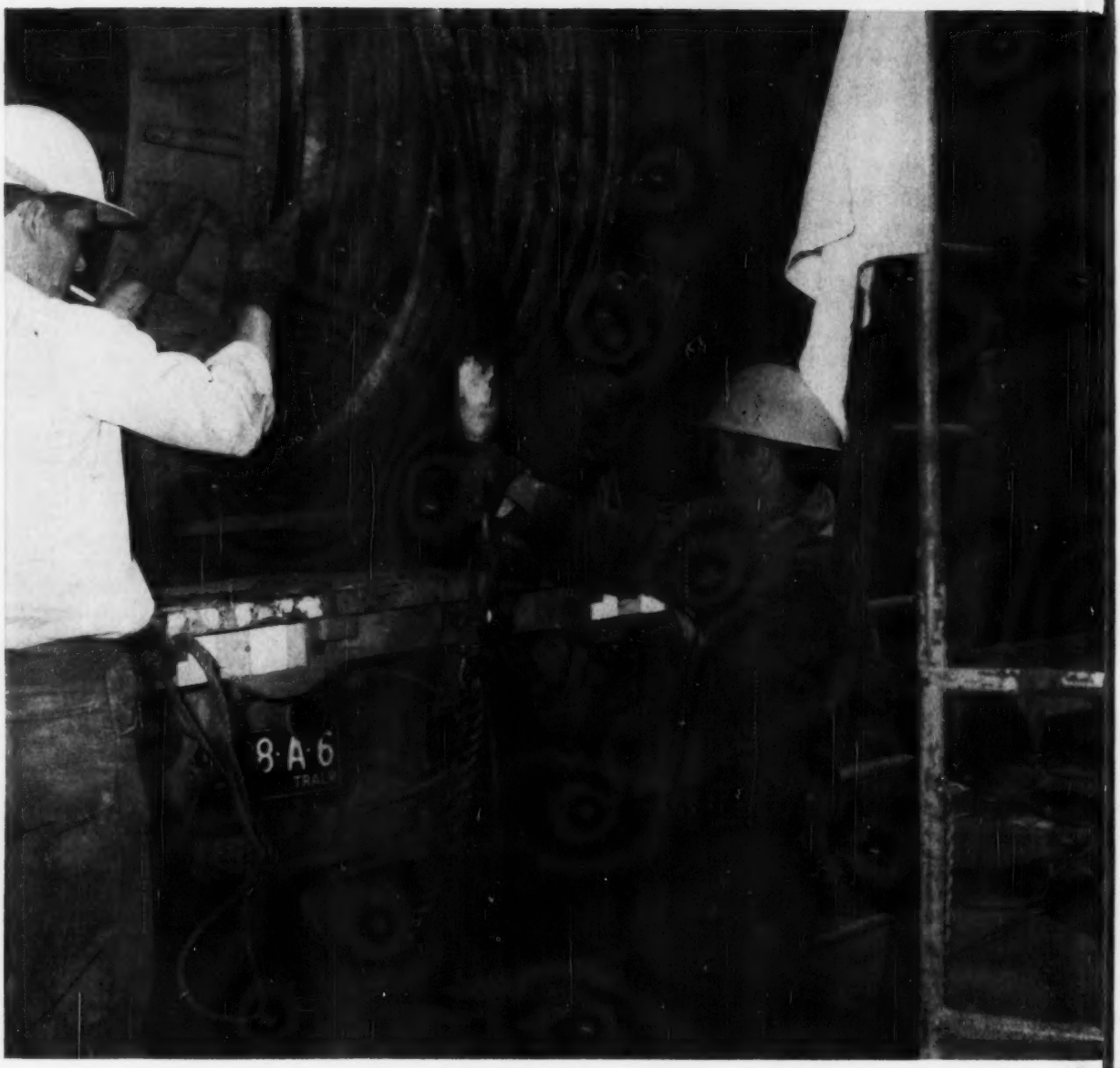
FOR FIGURES IN A HURRY—FIGURE ON A GE COMPUTER



Installing a Tiger Brand 15KV paper-insulated, lead-sheathed, gas-filled cable in big city network to obtain higher capacity and freedom from maintenance

Making a splice on a Tiger Brand Gas-Filled Cable is about the same as solid cable except for the simple splicing of the small tubes.

USS

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Tiger Brand Gas-Filled Cable consists essentially of one or more conductors having a conventional solid type saturated paper insulation and covered with a lead sheath.

It differs from solid-type cable in one important respect—it has small open helix steel tubes in two of the interstices of a three conductor cable to supply gas to the cable structure, and a solid walled copper tube in the third interstice to transmit gas pressure to joints and terminals. These are filled with dry nitrogen gas under a stabilized pressure of about 12 pounds. This system effectively controls sheath stresses, eliminating the major cause of cable failure. Sheath integrity is under constant supervision by the gas pressure monitoring system.

Increased Reliability. Advance warnings are received of any damage to the lead sheath. Moisture entrance to the cable is prevented and repairs can be made of any sheath damage before it has resulted in cable failure. In case of sudden emergency overloads, the pressures from the expanding oil are controlled through the gas feed channels, thus preventing any possibility of sheath rupture due to excessive pressures.

Proved Performance. Tiger Brand Gas-Filled Cables have been in use for many years. They have established a record of continuous performance with very little maintenance. For complete engineering information call our nearest sales office or write American Steel & Wire, Dept. 9352 614 Superior Ave., N.W., Cleveland 13, Ohio.

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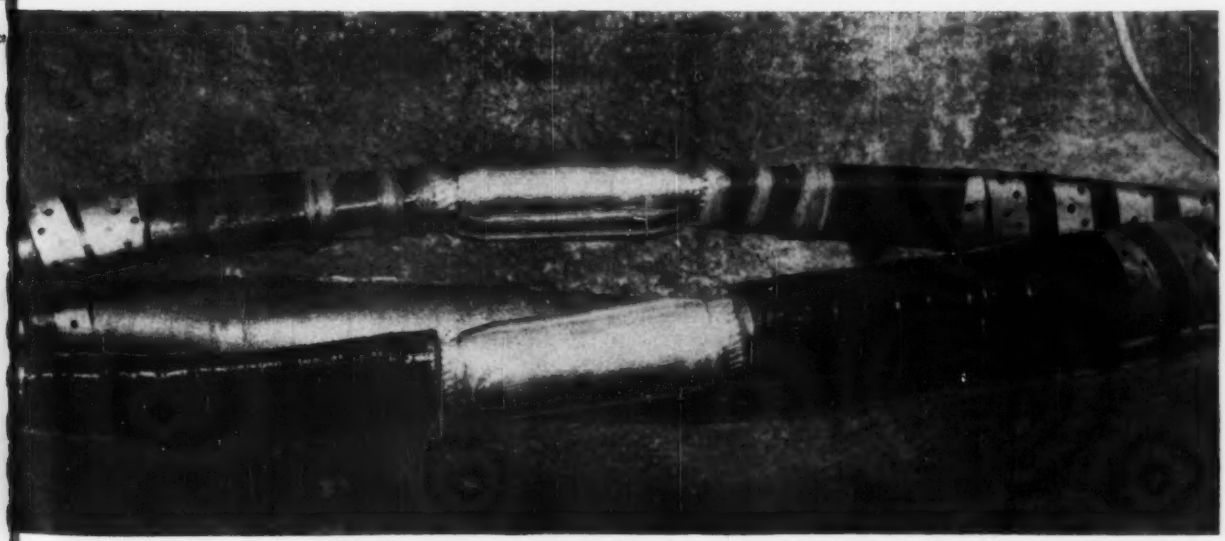


Industry Must Sell Ideas Harder

Wisconsin Utilities Assn discusses electric heating, aluminum for substations, and new pre-strike theory of lightning

We are on the road to more taxes, less freedom and more government competition in business unless we are as effective in selling our idealogy as the opposition has been in peddling the philosophy of government ownership and operation of utilities. Stuart V. Willson, president, Wisconsin Utilities Association, delivered this warning to the joint meeting of the operating and sales sections in Milwaukee, Oct. 15. In their separate meetings, held Oct. 14-16, the sections heard reports on the progress of electric heating sales, operating problems caused by storms, new telephone aids to system operation, and design details of Wisconsin's newest and largest generating unit.

Summing up a panel discussion on electric heating, chairman J. H. McLean said experience of the panel members indicated that "straight electric companies can sell electric heating with fierce gas competition." The panel consisted of E. O. George, vice president, Detroit Edison Co; R. L. Albaugh, system supervisor, residential sales, Indiana & Michigan Electric Co; M. E. Lukey, commercial manager, Commonwealth Edison Co; and W. T. Richards, vice president, Indianapolis Power & Light Co.

The panel differed as to the importance of rates in selling electric heating. Albaugh felt that rates were most important while George and Richards thought it was more important "to get in and sell." Points on which panel members agreed were:

1. Get architects, builders and engineers interested in electric heating.
2. Create customer interest in electric heating.
3. Sell only quality jobs, including insulation, and take steps to see that customers get quality jobs.
4. Get employees on the electric heating "band wagon."

$3 Million for Electric Home

The electrical industry plans a $3 million program to promote the all-electric home in 1960, said William Pierce, chairman, Edison Electric Institute advertising committee. This is an increase of a half million dollars over current expenditures.

"Will aluminum replace steel for substation structures?" asked Howard Graybill, ITE Circuit Breaker Co, adding that interest in aluminum for structures had been stimulated by a drastic reduction in the price of aluminum structural members. Advantages of aluminum, he said, are corrosion resistance and light weight. However, while aluminum resists sulphurous fumes, which are damaging to steel, the latter resists alkalies better than does aluminum.

Graybill said comparisons of installation costs of aluminum and steel structures are not conclusive; additional experience is needed before reasonably accurate purchase and installation costs of aluminum structures will be known.

Pre-Strike Theory Presented

H. E. Lokay, Westinghouse Electric Corp, told the operating section about a relatively new theory, the pre-strike theory, of the step-leader process of analyzing lightning phenomena and predicting transmission line performance. The theory indicates that when lightning terminates at the tower top the charge of current upward toward the cloud plays an important part in the performance of EHV lines. Calculations have ignored this component in the past; therefore, the calculated performance has not been realized.

Special equipment was developed to substantiate the pre-strike theory. While the method of calculating line performance using the new theory involves complicated mathematics, a simplified method is being developed which probably will be presented at the AIEE winter meeting, said Lokay.

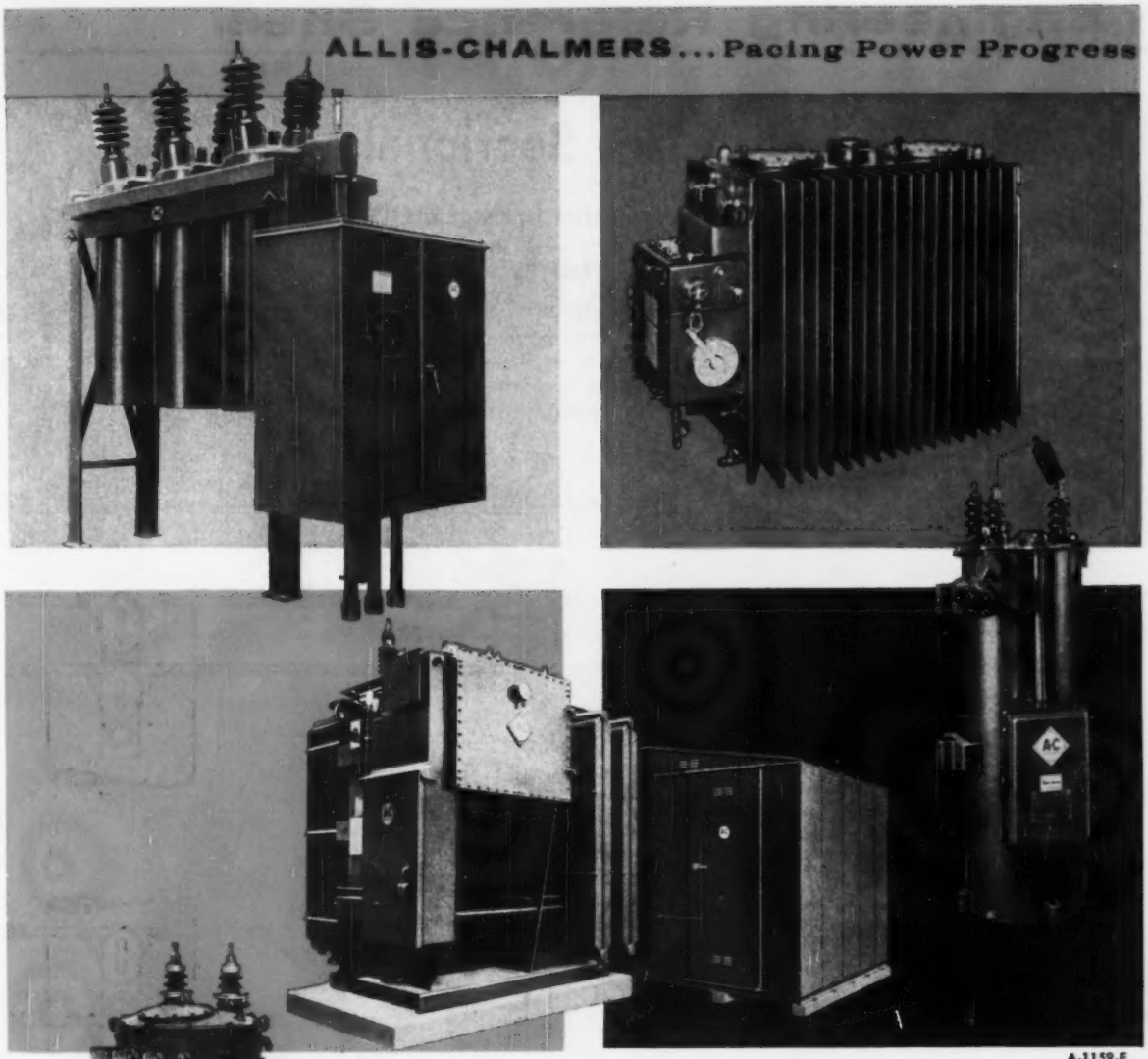
New telephone facilities soon will be helping electric utilities with some operating problems, said R. L. Ryan, American Telephone & Telegraph Co. A number of utilities already are testing an "electronic sentry" (EW, Jan. 5, '59, p 36). Another device is a group alerting system for use on telephone lines to alert up to 400 people quickly in case of emergencies.

Unit 5 at Oak Creek Station of Wisconsin Electric Power Co will have the center line of the unit at floor level, said Bernard S. Herbage, Allis-Chalmers Mfg Co. Advan-

(*Continued on page* 138)

ELECTRIC HEATING was the subject discussed by W. T. Richards, Indianapolis P&L; M. E. Lukey, Commonwealth Edison; J. H. McLean, Wisconsin Pub Ser; E. O. George, Detroit Edison; and R. L. Albaugh, Indiana & Michigan Electric

ALLIS-CHALMERS... Pacing Power Progress



A-1159-E

New Standards

for "standard" equipment

At Allis-Chalmers, only the very basic "nuts and bolts" for our equipment are standard. A-C researchers regularly improve and modernize designs to meet industry's constantly changing application demands. These same unique Allis-Chalmers product features and component designs have a habit of becoming standard on competitive equipment in the industry.

ALLIS-CHALMERS A-C

New standards of performance demonstrated on all A-C products. Contact your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

Install Secondary Sectionalizing Fuses

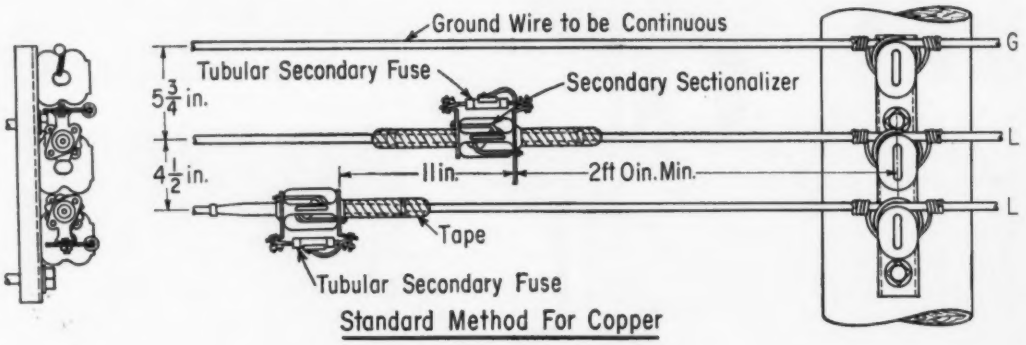
Adapted from distribution standards of the Detroit Edison Co

NOTES

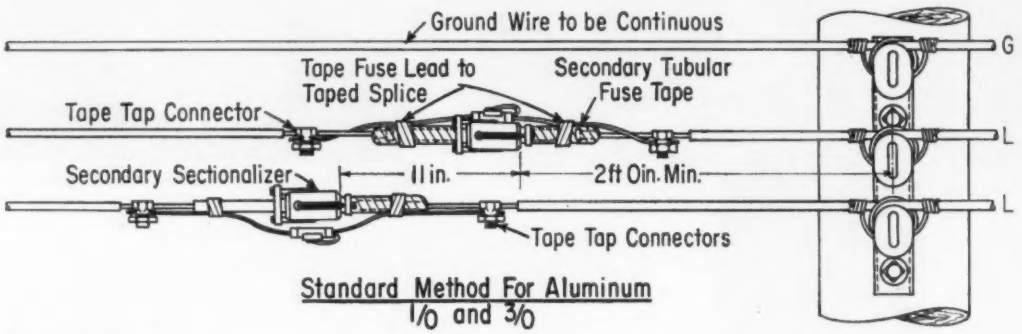
1. Planning division shall specify fuse location and size. Location will usually be at point of minimum load between transformers. Size will be determined by the smaller of the two adjacent transformers.

2. Install "Sect Bank" sign at all transformers in sectionalized bank. Install sign on fuse arm when present; or on transformer side of pole just above the secondary rack when fuse arm is not present.

3. Do not put fuses in secondary trainers of transformers in sectionalized secondary banks.

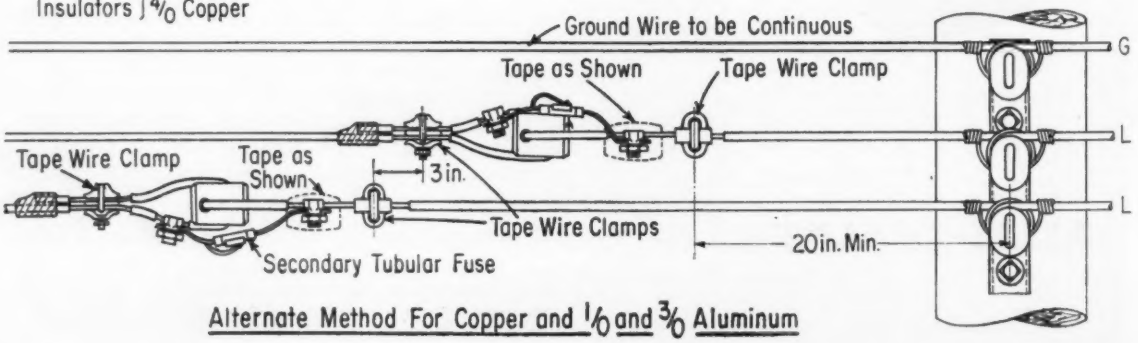


Standard Method For Copper



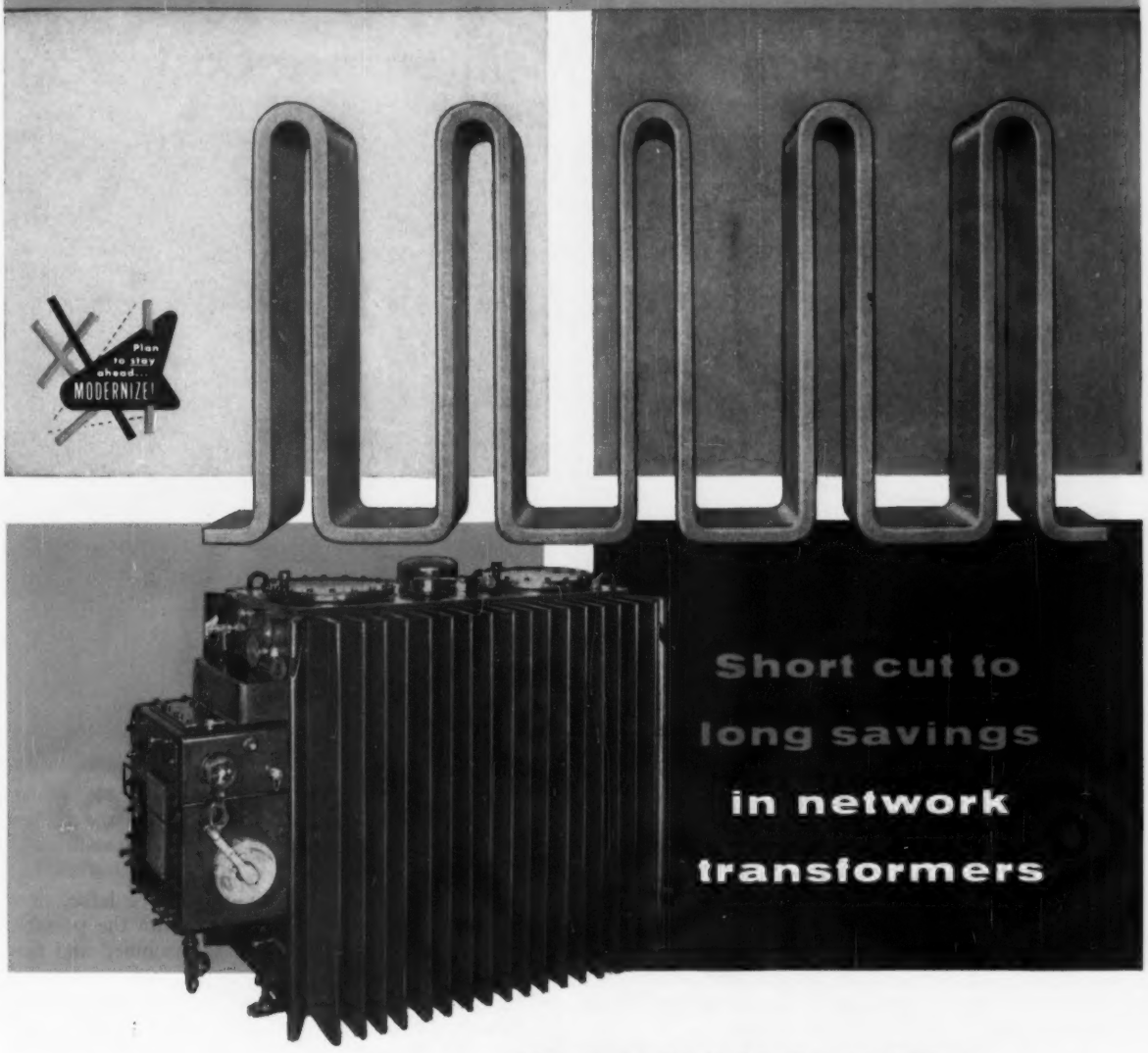
Standard Method For Aluminum 1/0 and 3/0

Medium Guy } 1/0 Aluminum
Insulators } 1/0 or Smaller Copper
Large Guy } 3/0 Aluminum
Insulators } 4/0 Copper



Alternate Method For Copper and 1/0 and 3/0 Aluminum

ALLIS-CHALMERS... Pacing Power Progress



Reduced Size and Weight Cut Installation Costs

Smaller vault requirements per kva is another economy advantage of this redesigned unit. With more compact units to handle, work crew efficiency is increased. And, of course, increased kva may be installed in existing vaults.

Corrugated tank surface simplifies cleaning and painting

Fluted tank design with its flowing surface continuity adds years of serviceability because: (1) Sharp corners and crevices are eliminated. (2) Easy visual inspection facilitates checking surface condition. (3) When required, reconditioning is simplified.

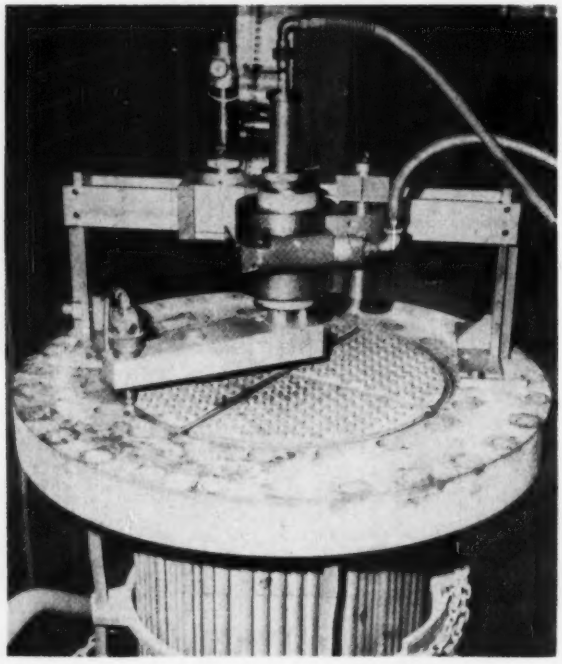
The proved maintenance economy of corrugated cooling surfaces is just one of the many more-for-your-money features of the new Allis-Chalmers network transformer.

For complete information, call your local Allis-Chalmers representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

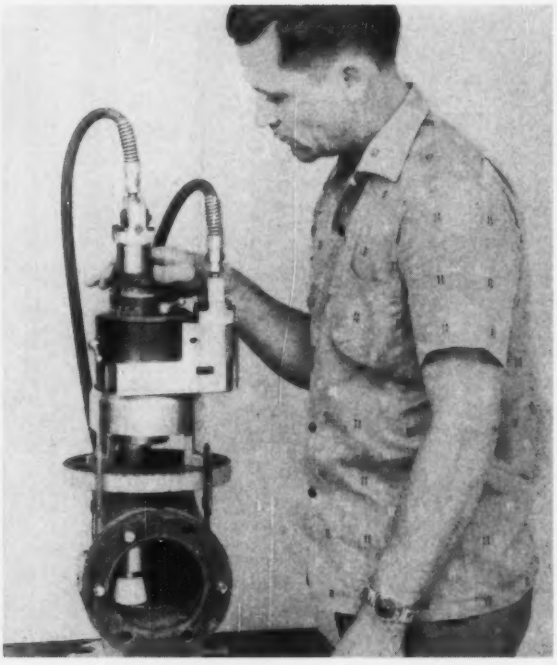
A-C ALLIS-CHALMERS

A-1017-E

Portable Grinder Cuts Maintenance Cost



WARPED HEAD of heater tube bundle was machined and grooves were cut with an attachment on the grinder



DEMONSTRATION TEST shows how portable grinder can repair seat without removing valve from the line

A portable grinding rig, developed by machinist Guy Gilmore of Central Power & Light Co, is reducing plant maintenance costs. Chief advantage of the machine is that it is versatile and portable. It weighs only 37 lb, can be operated by one man, and cuts the time required for many jobs in half.

A saving of $1,500 was estimated for a recent job of smoothing the warped head of a high pressure heater tube bundle. Gasket grooves in the tube sheet had to be re-machined. Normally this would have required moving the bundle to a large lathe, or a complete retubing job. However, with the portable rig, the heater bundle head was machined and new grooves were cut with tubes in place.

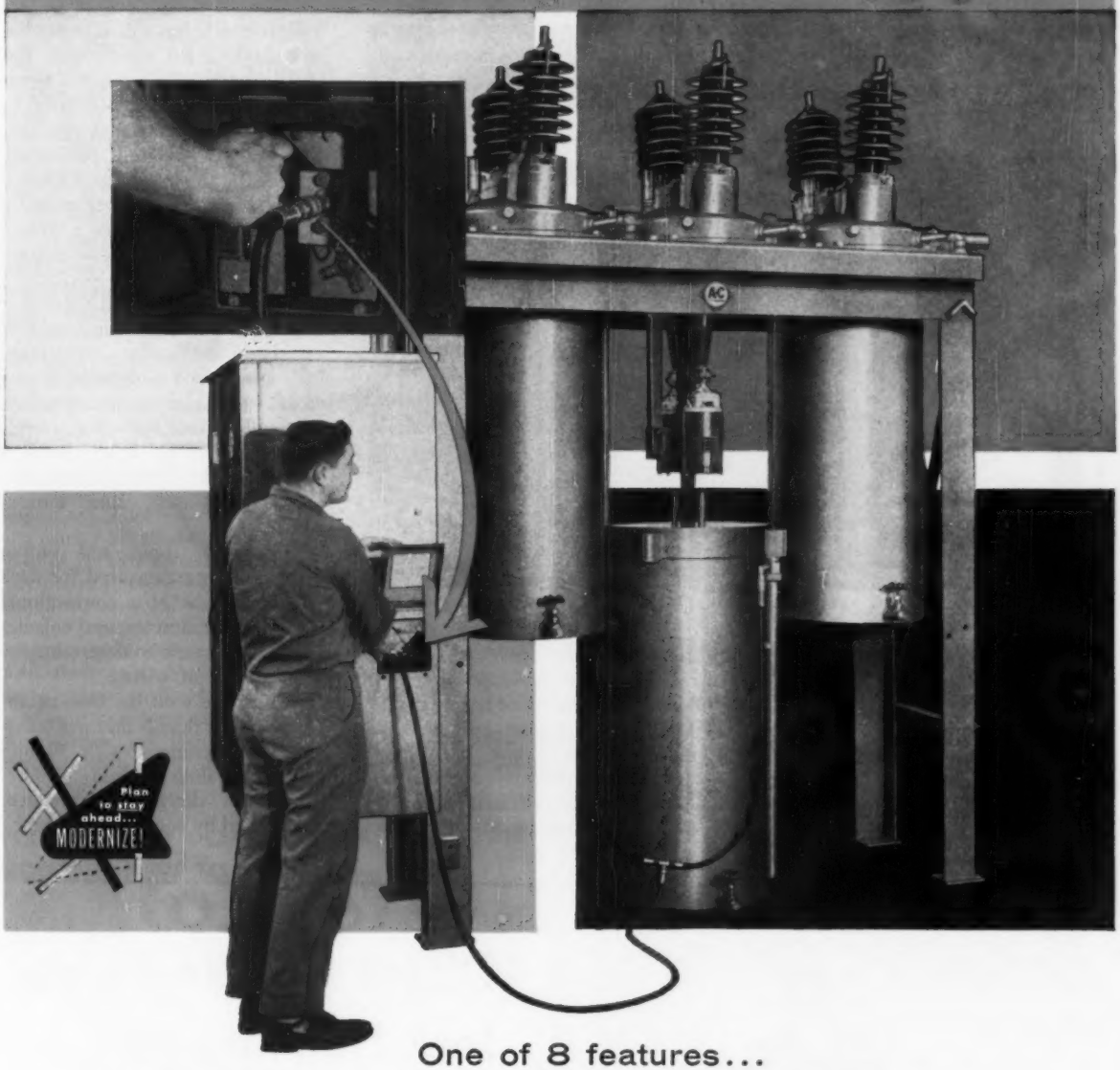
The grinder also has been used for such jobs as boring out volute pump casings and eccentric grinding. It has proved very valuable and time saving in grinding collector rings on turbine generator sets. The grinder also has handled many grinding, machining and boring jobs in difficult-to-reach spots.

Pole Tag Shows Fuse Size

Fuse coordination has received an assist on the Consumer Public Power District system from aluminum tags placed on poles to indicate the proper fuse size to be used on that branch of the circuit. Use of the tags minimizes the chance that servicemen will install incorrect fuse sizes when making replacements. The idea of using fuse sizes on aluminum tags was suggested by R. I. Coyle, who is service dispatcher for the Lincoln District.

(*More Methods on page* 80)

ALLIS-CHALMERS... Pacing Power Progress



One of 8 features...

light, fast-acting hydraulic tank lifter

LIFTING and lowering tanks is a one-man job with light, easy-to-handle, easy-to-operate A-C tank lifters. No cables, no pulleys . . . can even be operated manually with *Pneu-Draulic* operator hand pump if control power is not available. Compared with old methods of raising and lowering tanks — takes 80% less time.

Operating Advantages

But this is only one of many outstanding operating advantages of Allis-Chalmers large frame-mounted breakers.

Standard A-C features include:

New 5-cycle interrupting devices
Reliable, fast-acting *Pneu-Draulic* operator
Mechanically and electrically trip-free
Float-type oil gauge
Position indicator
External adjustment of overtravel stop
Single lift-rod guide for accessibility

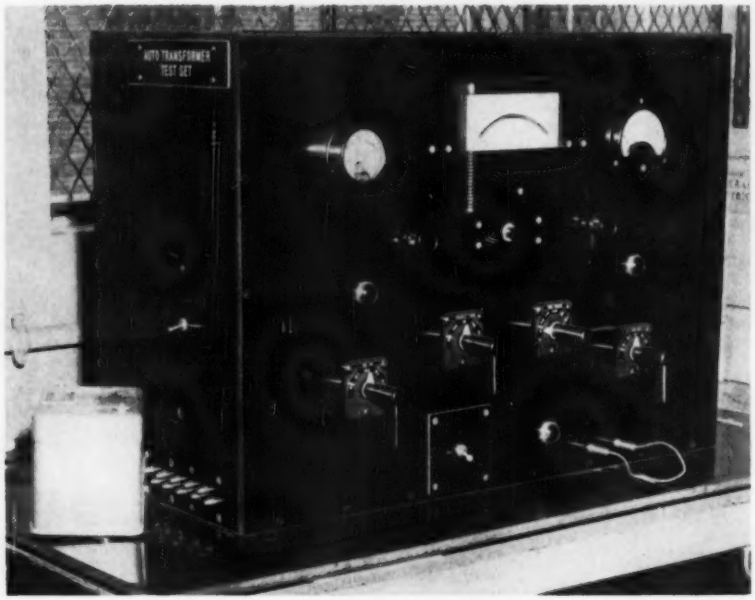
Write for Bulletin 71B8475. Contact your nearby A-C office or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

Pneu-Draulic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-5958-E

Device Speeds Autotransformers Checks



A. R. JONES, Test Engineer, Long Island Lighting Co, Hicksville, N. Y.

A semi-automatic device for checking input and output voltages, phase sequence, voltage balance, and current drain, on autotransformers to be used in association with revenue metering, has been developed by the Meter Department of Long Island Lighting Co. Either delta or wye autotransformers can be tested with the equipment.

Connections to the transformer under test are made through quick contactors on the side of the device. By means of a potentiometer adjustment, the input voltage is equated to 100% on an indicating voltmeter having a special scale marked in percentage rather than volts. Connections to the various transformer taps are made by means of a rotary switch, and the output voltage values are shown in percentage on the specially scaled voltmeter.

When the transformer is correctly wired, the percentage shown on the voltmeter is the same as that on the rotary switch position. Accessory instruments included in the unit permit a quick check of phase sequence, voltage balance, and current drain.

Formerly, input and output voltages were measured for each tap by means of a conventional indicating voltmeter, and calculations were made to determine the correctness of wiring.

Test time with the new equipment is less than 5 min per transformer in contrast with 30 min by the previous method. The device was designed, fabricated, and wired by company personnel.

Offset Handle Eases Jack Hammering

FREDERICK CORTELLA, Underground Lines Division, Detroit Edison Co, Detroit, Michigan

Underground crews on the Detroit Edison Co's system are using a special offset handle on air hammers when drilling with a rock drill under sidewalks and driveways for laying street light cable. The offset handle extends about 2½ ft at right angles to the hammer body. The handle is long enough so that the hammer can be operated from the top of the trench.

Without the offset handle, an underground crew man had to get down in the trench to control the hammer. When the operator worked in the trench, flying sand and dirt made control of drilling difficult. Working in the confined area also exposed the operator to the possibility of eye injuries.

THE POWER MAN WHO WANTS PEACE OF MIND

CHOOSES VICTOR

SERVICE IS ALL YOU SELL

It's a big responsibility to serve thousands of customers, ranging all the way from householders to big industrials. Actually, service is all you have to sell . . . because power alone isn't worth much until it lights lights, heats heaters or turns motors. That's why power men lose sleep, get ulcers, and suffer bad cases of jitters whenever a bad storm threatens continuity of service. The man with greatest peace of mind, however, is the man who standardizes on VICTOR Suspensions. These insulators are made with careful attention to detail. They're made of Purified Porcelain—finest insulator porcelain ever made. And they are rigorously tested with the most modern testing equipment in the industry. All these are good reasons for peace of mind. Remember: VICTOR sells service, also—insulator service that helps you to serve your customers better. We want peace of mind, too. That's why we make insulators that won't cross *us* up—or you, either.

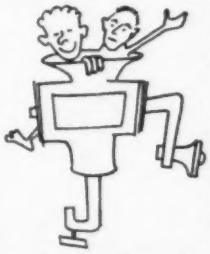
"FILTERS" AND "SACKS" NOTHING NEW TO US

All this noise about filters and sacks leaves us a bit cold because we've been using both for years. All of which is merely a roundabout introduction to the fact that filters and sacks perform an indispensable function in the making of insulators. You see, after the clay "slip" or mix is prepared it is pumped into canvas sacks, on each side of which are the heavy metal plates of the filter press. After the sacks are full, hydraulic pressure is applied to the plates and water begins to be squeezed out of the clay. The pressure is maintained for about one and three quarters hours. In that time the water content of the clay is reduced from its initial 50% to 20%. Pressure is then released, the presses opened and the resultant clay "leaves" removed and placed in a room for aging.

VICTOR NO. 900
Suspension Insulator

NO, A PUG MILL DOESN'T GRIND PUGS, IT MAKES THEM

The "leaves" of clay mentioned above are then fed into vacuum pug mills which shred the clay, extract by powerful vacuum the tiny air bubbles entrapped during filter pressing. The pug mill then extrudes the clay in the form of a long cylinder which is cut into sections or "pugs," each of which is exactly the right diameter and length for the size and type insulator to be made. As a result of utmost care, rigid quality control and the exclusive use of demineralized water, the clay extruded from the pug mills now has maximum density, plasticity and workability.



INSULATORS, LIKE PANTS, NEED PRESSING, TOO

Actually we call our process "hot pressing"—and for a very sensible reason. Clay pugs are pounded solidly into plaster molds. The molds are then fed to a hot pressing machine. After dabbing a spot of oil on the clay surface for lubrication, the operator trips a lever and a revolving heated die descends into the clay, forming the inside contours of the particular insulator being made. All suspensions are made in this way. Molds then go into a VICTOR-designed infrared mold-release dryer which permits drying in minutes instead of hours.

SOMETHING TO HANG ON TO!

To make sure that cap and pin hang on to a suspension insulator body even under pulls of nearly twice their rated values, a band of sand is coated on the surfaces to which the cap and pin are cemented. A band of slow-drying glaze is painted on these portions and porcelain sand sifted on to form a rough bonding surface which the cement will grip tightly. VICTOR makes its own sand so that it will have the proper composition and thermal expansion characteristics for maximum strength.

For full information on VICTOR Suspension Insulators, write I-T-E Circuit Breaker Company, Victor Insulators Division, Victor, N.Y.

I-T-E CIRCUIT BREAKER COMPANY

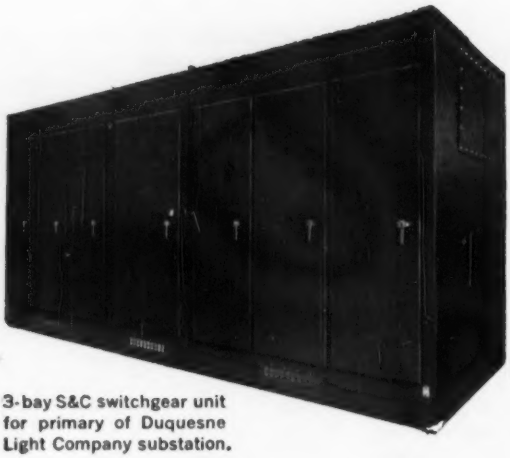
VICTOR INSULATORS DIVISION

Question:

How does Duquesne Light Company approach the problem of locating 23 kv substations in closely built-up residential areas?

Answer:

By using completely metalclad substations with S&C metal enclosed fused load interrupter switchgear developed cooperatively by Duquesne and S&C; and by putting the 23 kv and 4 kv circuits underground (as shown at right).



3-bay S&C switchgear unit for primary of Duquesne Light Company substation.

Q. Why is S&C metal enclosed fused load interrupter switchgear suited to substations in closely built-up residential, commercial, and industrial areas?

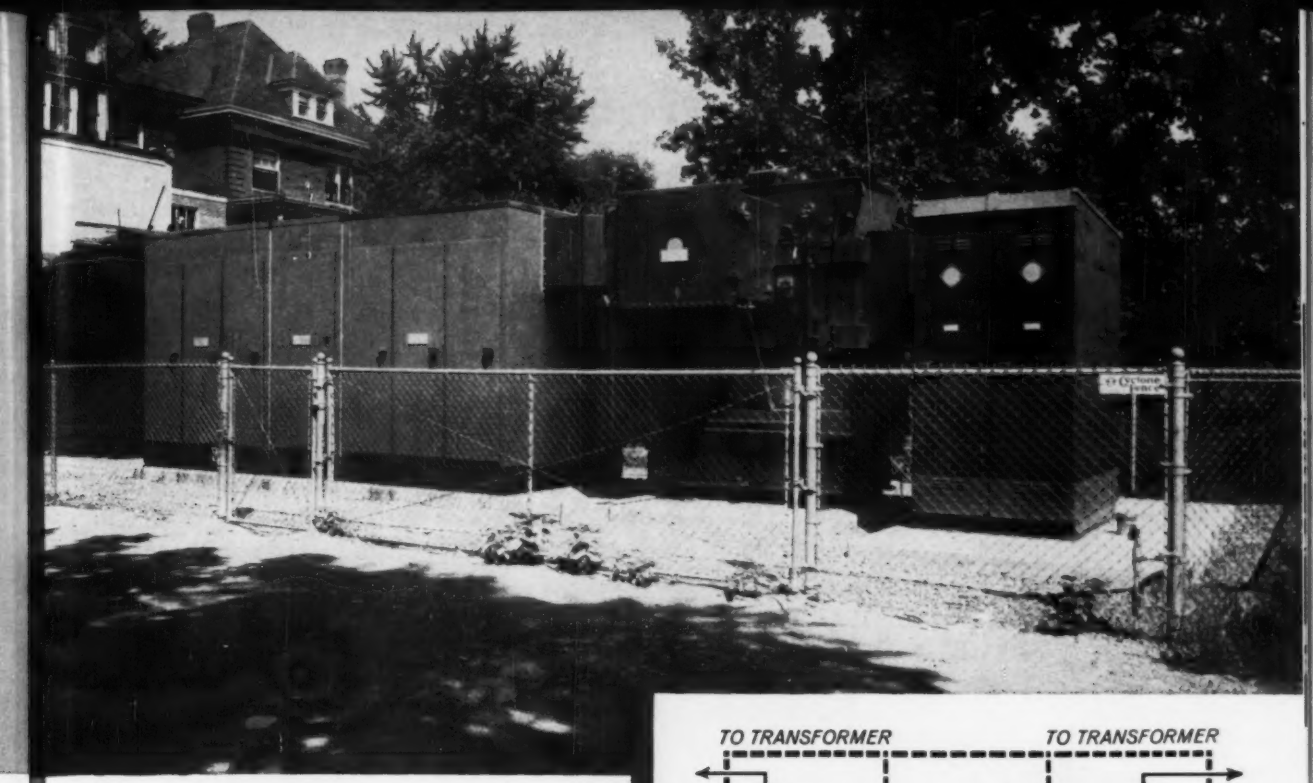
A. Because it gives safety to the public, attractive appearance, and compactness.

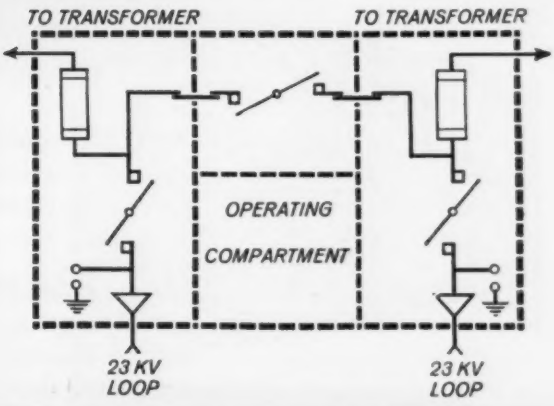
Q: How is attractive appearance achieved?

A. By eliminating steel structures or wood poles, exposed switches, potheads, fuses, and lightning arresters. This gear is also streamlined so that a Duquesne substation offers a low silhouette which fits unobtrusively into its surroundings.

S&C

Specialists in High-Voltage Circuit Interruption





Q. What does compactness mean to Duquesne?

A. Large sites are not required for these substations, thus the difficulty of site procurement, not to mention the cost, is significantly reduced.

Q. Why was S&C chosen to participate with Duquesne in this cooperative program to develop a completely metal-enclosed 23 kv substation?

A. Because S&C had developed compact load interrupters for arc-free switching, as well as a correspondingly compact power fuse with controlled exhaust—both ideally suitable for metalcladding.

Q. How can utilities learn more about the use of S&C metal-enclosed fused load interrupter switchgear?

A. Write for additional information to S&C Electric Company, 4421 Ravenswood Avenue, Chicago 40, Illinois. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 18, Ont.

S&C METALCLAD FUSED LOAD INTERRUPTER SWITCHGEAR

S&C

Procurement & Products

FLEET ▶ **Compact cars are getting the big eye** from fleet buyers in utilities as well as in other industry. Several utility purchasing agents within the past few weeks have waxed enthusiastic about the entry of the big three into the small car field. They see the new entries as extension of the Lark and Rambler found in a number of fleets.

"We plan to buy heavily in the small car market," a Texas power company purchasing agent told Purchasing Week. This utility has definitely decided to try the Falcon and Corvair and will add to its supply of Larks and Ramblers. A PA from an eastern utility expressed the same view, but a little more conservatively. Most fleet operators are counting on lower storage and maintenance costs as well as lower first costs.

FUEL OIL ▶ **Will there be an East Coast residual oil shortage this winter?** There could be, says the Chase-Manhattan Bank, unless import quotas are adjusted sharply upward in 1960. There's less residual around for Eastern consumption than the U. S. totals would seem to indicate, the bank says, as California must be considered a separate economic unit.

Strip California data out of the picture, the bank points out, and you will find that residual inventories are no higher than normal. Also, the yield of residual fuel per barrel of crude is lower than it appears to be when heavy West Coast oil is included.

Assuming that this winter's demand is the same as last winter's, and subtracting the estimated domestic residual production and the balance of this year's imports, Chase finds that inventories will have dropped to their lowest possible level by the end of the year.

ALUMINUM ▶ **Strike fears are believed to play a part in high aluminum output.** The aluminum industry agreement was that if steel reaches no settlement by Nov. 1, after ten days notice either side could take action. Producers may consider it a good idea to keep primary aluminum at a good level and ship metal to fabricating plants and elsewhere.

PRODUCTS ▶ **New pad-mounted distribution transformer** for residential underground systems is being marketed by General Electric Co. Ratings will range from 25 to 100 kva. Construction crew foreman may be among the beneficiaries of a new "Citizens' Band" two-way radio announced last week by Radio Corp of America. The set weighs only eight pounds and operates on 6-v or 12-v batteries or 115-v ac current.

News of Manufacturers ..... page 87
New Equipment ..... page 100
Readers Service ..... page 102

SOUTHERN ELECTRICAL'S

GROWING FAMILY OF

Compresto® Cables

From Southern Electrical Company's engineering laboratories, which developed "COMPRESTO" cable for the electrical utility industry, comes a NEW member to the "COMPRESTO" family, **19 WIRE COMPRESTO.**

NOW AVAILABLE — IN COMPRESTO

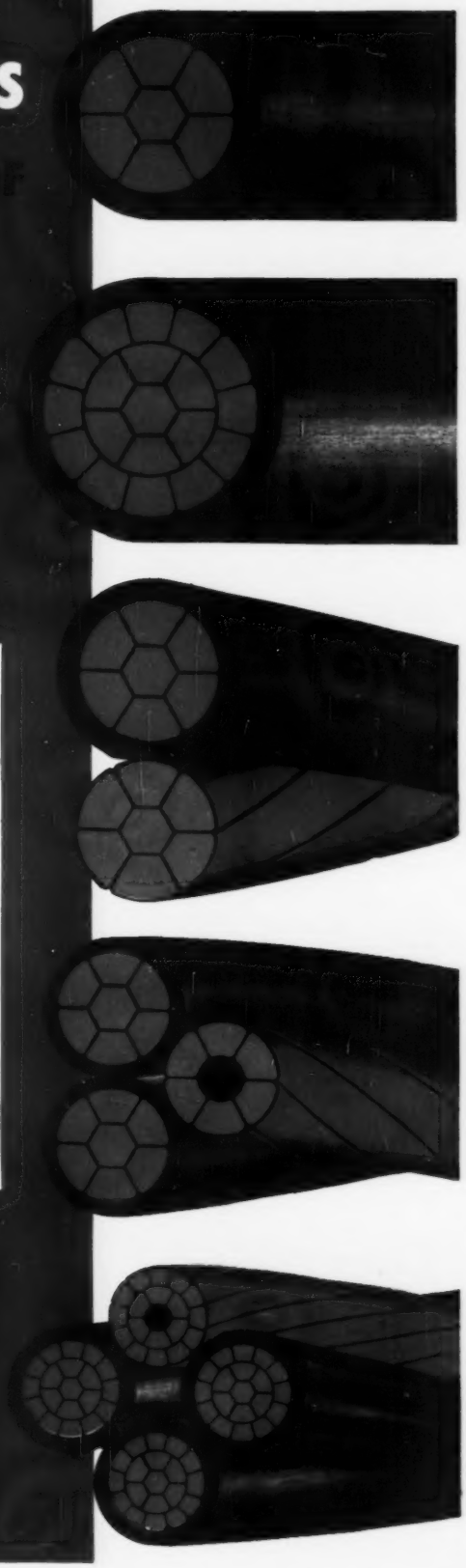
19 wire All aluminum conductors — sizes up through 336, 400 CM

18/1 ACSR Conductors — sizes up through 336, 400 CM

Available with,
NEOPRENE, POLYETHYLENE or TWO COAT INSULATIONS

Available as,
COVERED LINE WIRE, DUPLEX, TRIPLEX and QUADRUPLEX

Developed for the growing need of secondary service cables.



Southern Electrical Company

CHATTANOOGA, TENNESSEE

Sell a new world of warmth...

Arvin

RADIANT AND FAN FORCED ELECTRIC WALL HEATERS

Your customers will welcome the warm comfort, appreciate the handsome styling and be glad they chose an Arvin no matter which of these fine electric heaters they decide to buy.

And buy they will because of the decided overall superiority of the Arvin line. Instant heat, complete safety, ease of installation, attractive prices are all customer-convincing Arvin advantages that give you a big edge over competition.

Arvin's 27 years of experience and world leadership in portable electric heat is so readily apparent in the entire line that even a casual comparison with others emphasizes the business wisdom of selecting Arvin.

Saleswise, profitwise, the Arvin line will work best for you!

Arvin 100 Series—Instant heat, high styling, complete safety win sales for these sleek, slim-lined radiant bathroom heaters. They're wanted on sight!

Arvin 200 Series—Best of all bathroom heaters. Nichrome® elements produce a wealth of warmth, quiet fan circulates it, thermostat maintains temperature.

Arvin 400 Series-Heavy-duty, for home or office use. Push button controls, Safety Limit Thermostat and warmth-casting reflectors are buy appeals in all models.

Arvin 300 Series—In Summer the husky fan cools, in Winter it provides extra penetration of warmth. Push button controls in all five models.

Arvin also manufactures a complete line of Ceiling Cable with deluxe and standard wall thermostats in both single and double pole.

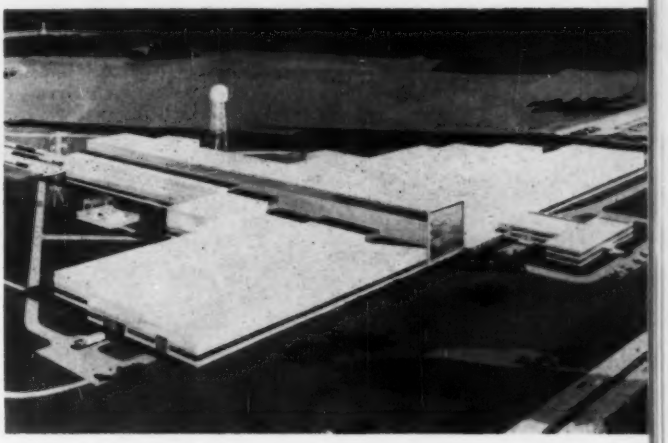
Arvin

ARVIN INDUSTRIES, INC.
Consumer Products Division
COLUMBUS, INDIANA

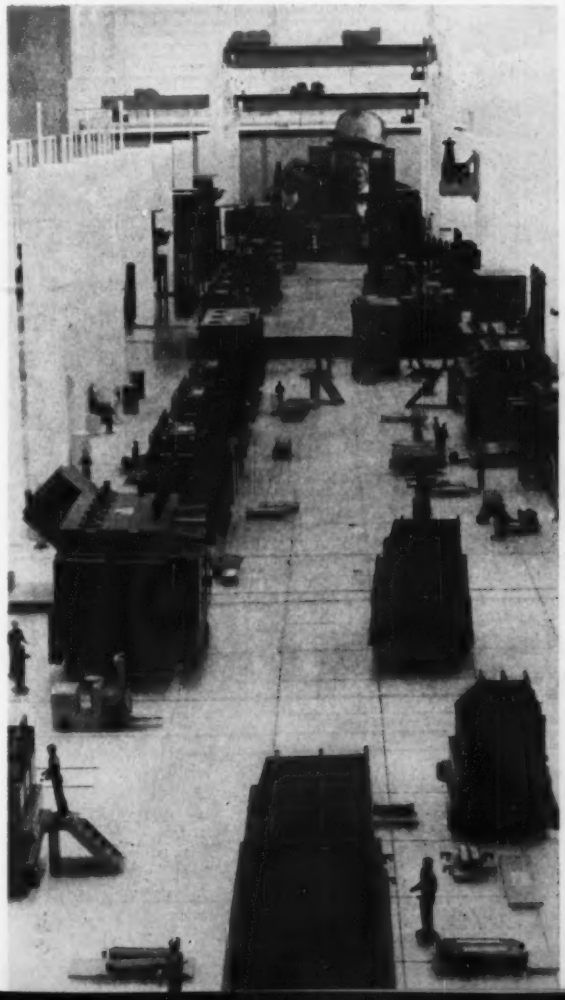
Work to Begin on Power Transformer Plant

When ground is broken this Thursday for Westinghouse's new power transformer plant in Muncie, Ind., the company will be embarking on its largest single capital expenditure. And two years later, when production begins, the company will be able to make transformers with double the voltage rating it can now handle at its Sharon, Pa., plant. In three-phase ratings, Muncie will be able to produce 75% higher kva; in single-phase bank ratings, 300% higher kva. The plant will have a 78x78x70-ft sound measurement and corona test room. Impulse tests in excess of 600-kv will also be performed on completely assembled units. Production of small and medium power transformers will continue at Sharon, where headquarters for the power transformer department will remain.

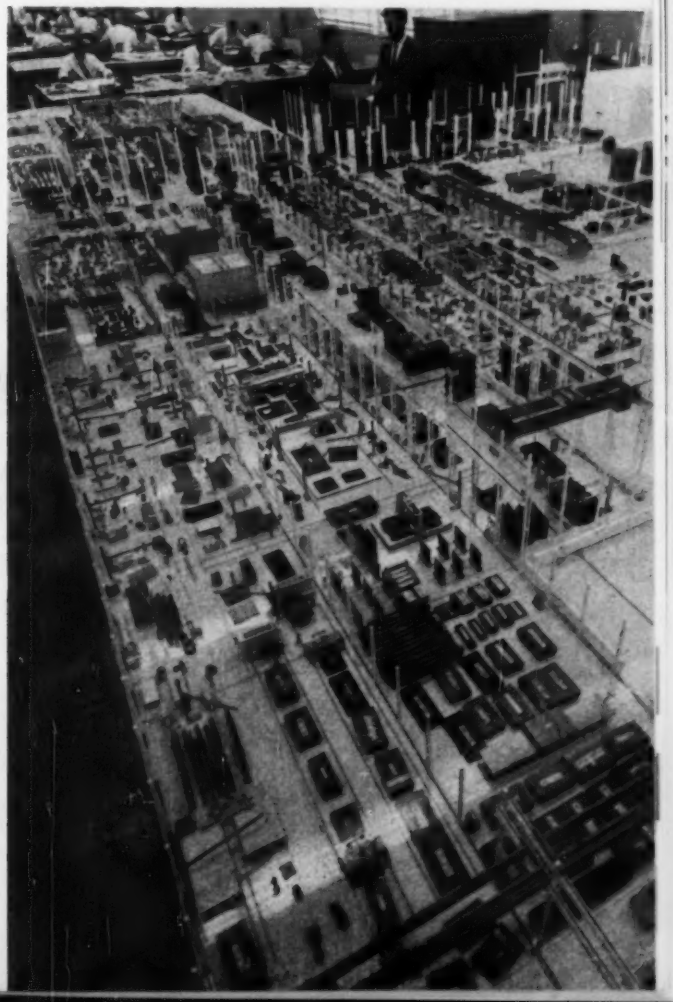
(*More News of Manufacturers, p* 90)



HIGH BAY AREA will house main assembly line. Dual cranes will run on rails 60 and 80 feet high



PLANT MODEL represents three years of work by over 60 planning specialists to determine the optimum plant layout



THIS IS CORONA EFFECT

SPECTACULAR—
BUT IT'S ONE OF HIGH-VOLTAGE CABLE'S WORST ENEMIES

Corona means crown. It can also mean trouble for ordinary high-voltage cable—because corona is also the name for a low-energy electrical discharge (the glow around the crown at left) which actually cracks and splits ordinary rubber insulation. How? By ionizing any air in between and around conductor and insulation, it creates ozone, ultraviolet light, and certain nitrogen compounds.

And ozone, for example, works itself into ordinary rubber insulation and splits the long-chain rubber molecules. In time you see the costly result—cracked insulation and cable failure.

HERE'S ANACONDA'S ANSWER

Butyl—the most effective rubber insulating material ever developed—has inherent resistance to ozone. And—to aging, moisture, and heat.

But—butyl handles differently from other rubbers. Additives, usually in the form of finely divided powders, are extremely difficult to disperse uniformly in the raw butyl. Butyl also presents special vulcanizing problems. In short, proper manufacture of butyl insulation requires specialists and specialized equipment at every manufacturing step.

That's why Anaconda built a new plant for just one product—Anaconda Butyl (AB) Cable. The men behind this specialized equipment have but one job too—to study and improve the design and manufacture of butyl-insulated high-voltage cable.

This specialized manufacture and specialized inspection, test and quality control are part of the reason why Anaconda Butyl (AB) Cable means long-range economy and reliability, and why you should specify (AB) to protect your investment in high-voltage cable.

Send for publication DM 5903: High-Voltage Durasheath* Cable to Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

*Reg. U.S. Pat. Off. 50257

ASK THE MAN FROM

ANACONDA®

ABOUT BUTYL (AB) HIGH-VOLTAGE CABLE

ACCO *Aluminized* CORE WIRE

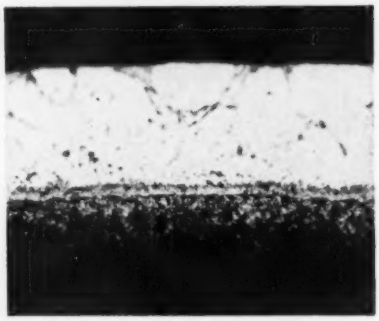
Outlasts Galvanized at least 2:1!

Page ACCO *Aluminized* core wire for ACSR provides all the strength of steel plus the corrosion-resistance of aluminum. An adherent, ductile coating of aluminum is applied by Page's patented hot dip method. Salt spray testing conducted according to ASTM procedures proves that ACCO *Aluminized* wire should last *at least twice as long as galvanized.*

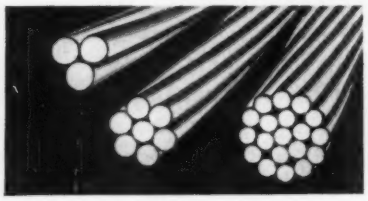
It is available from leading manufacturers of ACSR who have recognized the advantages of stranding aluminum conductor wires over an aluminized steel core—eliminating the "third metal" (zinc) in the completed conductor cable. Aluminized steel core wire assures longer life for your ACSR in both marine and industrial atmospheres.

Next time you order conductor cable, specify ACCO *Aluminized* core wire—it gives more reliability per dollar than any other core wire available.

500X magnification at right shows thin aluminum-iron alloy resulting from diffusion of the two metals, and the outer layer of aluminum in the form of a fine-grain cast structure.



OTHER ACCO *Aluminized* STEEL WIRES



ACCO *Aluminized* steel strand is available with 3, 7 and 19-wire construction for guy, ground and messenger wire applications. Offered in Common, Siemens-Martin, High Strength, Extra High Strength, Utility grades.

Page chain link fence of ACCO *Aluminized* wire provides attractive, economical and longer-lasting protection.

Tie wire, telephone and telegraph wire, barbed wire and other products also are available in Page ACCO *Aluminized* wire. Ask us for details.

WRITE FOR DETAILS...

Booklet DH-537 explains the manufacture, properties and uses of Page ACCO *Aluminized* steel wire. Write us at Monessen, Pa., for your copy.

PAGE MANUFACTURERS WIRE

ACCO

Page Steel and Wire Division
American Chain & Cable Company, Inc.
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore. San Francisco, Bridgeport, Conn.

PAGE *—the source for answers to wire problems*

General Electric Ships 305-Ton Stator of T-G Set

General Electric's shipment of a 305-ton stator for a 325-Mw, cross-compound steam turbine generator October 14 was the heaviest single piece of equipment ever shipped by rail from the Schenectady plant. It will be installed in Public Service Electric's new Mercer station in Hamilton Township, near Trenton, N. J. A similar stator was scheduled for subsequent shipment to the same plant.

Special arrangements made for the shipment included use of a 58-ft flatcar which travelled at not more than 15 miles per hr.

Second Annual Insulation Conference Scheduled

The second annual session of the National Conference on the Application of Electrical Insulation is scheduled for December 7-11 at Hotel Shoreham, Washington, D. C. Around 45 technical presentations are planned, with one section of the meetings devoted to distribution equipment. One hundred exhibits were already scheduled, exceeding at this early date the 65 which were shown last year (See page 69).

Speakers include H. B. McClure, of Alabama Power, presenting "The Need for Improved Applied Insulation in Metal-clad Switchgear." Among the commercial and government exhibits will be one sponsored by the Bureau of Power, FPC, "Future of Electric Utility Industry." The Department of Commerce will have an exhibit based on the work of the National Bureau of Standards, Patent Office and other phases of its activities. The Bureau of Water & Power will show a model of Bonneville or Big Thompson. "Summary of Atomic Energy" will be the theme of an exhibit sponsored by the American Museum of Atomic Energy.

On Friday, December 11, at the close of the session, there will be tours of the atomic reactor at Fort Belvoir, Va; the Western Electric cable plant at Baltimore; and the National Bureau of Standards laboratories.

The conference's present general

(*Continued on page* 92)

YOU GET

LONG-LASTING PROTECTION FOR YOUR OVERHEAD SYSTEM

with

BLACKBURN *Grounding* DEVICES

Type GTC 1
One plate tower ground clamp

Type GTC 2
Two plate tower ground clamp

Copper Bonded Pigtail

Type GUV
U-bolt ground clamp parallel or 90°

Steel Driving Stud for Sectional Ground Rods

Copper Alloy Coupling for Sectional Ground Rods

Copper Bonded Sectional Ground Rods

Copper Bonded Regular Ground Rods

Type GG
Ground Rod Clamp
Socket set screw

Type GGH
Ground Rod Clamp
Square head bolt

Type B
Budget Line Ground Rod Clamp
Square head bolt

Type GP 100
Electrolytic Copper Pole Bottom Plates
7½", 10", 14" dia.

Blackburn grounding devices will save you thousands of dollars annually in preventing burnouts of expensive overhead equipment. This complete line simplifies your stocking problem—one source for all your needs. Like all BLACKBURN products they are constructed of high-strength corrosion resistant materials—designed for easy installation and engineered for long-lasting, trouble-free grounding. Always specify BLACKBURN.

Available Through Electrical Wholesalers Everywhere

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KORTICK MFG. CO.

JASPER BLACKBURN CORPORATION
ST. LOUIS 14, MO., WYdown 3-9430
1525 WOODSON RD.

The design work on all these new substations is going to be hard to handle with our present force.

Of course! They have enough to do handling routine duties. Why don't you call in PIONEER?

GIVE YOUR NON-ROUTINE OPERATIONS TO PIONEER

Design and Consulting Engineering Services

Pioneer has specialized in designing power plants for 57 years. It offers design service for fossil fuel, hydro and atomic plants. It will also assist in forecasting load growth, in site selection, in purchasing and expediting of equipment and in supervising construction. Pioneer's other services include substation, transmission and distribution studies and design.

Services in Regulatory Matters

Pioneer offers its services in all phases of Federal, State and Local regulation including the rate base, depreciation analysis, cost of service studies, market analysis, certificate proceedings and rate of return.

Corporate Services

Pioneer's services in corporate matters include business and management engineering advice, financial, accounting and tax counsel and insurance and pension plans and programming. It maintains a complete stock transfer, ledger and dividend disbursement service.

NEW!
On your letterhead, write for 40-page booklet, "Pioneering New Horizons in Power". Describes, illustrates Pioneer's engineering services, and corporate services, from financing to operation.

57 YEARS

Pioneer Service & Engineering Co.

231 South La Salle Street
Chicago 4, Illinois

Second Insulation Session

(*Continued from page* 90)

planning committee is composed of 30 representatives; it is expected to be smaller in future years. NEMA has already appointed its board of sponsors and AIEE is in process of doing so.

The possibility of holding annual insulation conferences is predicated upon the belief that this year's and last year's receptions will warrant such planning. An alternative would be the holding of a main conference in Washington every other year and a regional one on alternate years. Tentative plans have been made to hold a third annual conference at the end of '60 in Chicago.

Westinghouse Announces Powercasting Program

Powercasting—a new program to help utility management accurately forecast its long-range system needs—has been announced by Westinghouse Electric.

"Using the Powercasting concept, utilities can find the optimum plan to follow in expanding system generation and transmission to meet increasing loads," said J. K. Dillard, manager of electric utility engineering for the company. In addition, such diverse and important questions as 1) when to retire old turbines, 2) how much to spend for reliability, and 3) what spinning reserve policy to use can be answered.

"Departing from conventional techniques, the Powercasting program makes use of mathematical models that duplicate all or any portion of the utility system. Using a digital computer, actual day-by-day operation can be simulated over a long period, usually 20 years. All system variables: technical, financial, and human—both predictable and random—are taken into account. Use of operation gaming methods—a combination of system analogues, Monte Carlo techniques, and human competition—can provide solutions to problems with so many variables that they can't be described by specific formulas or probability equations.

"When a utility cannot justify

(*Continued on page* 97)

KAISER ALUMINUM

KAISER ALUMINUM RIGID CONDUIT

IS A SURE BET TO LOWER COSTS

BECAUSE...

IT COSTS NO MORE TO BUY

And IT OFFERS COMPLETE ASSURANCE O

Contractors everywhere are finding that the old ways aren't necessarily the best ways when it comes to buying and installing rigid conduit. The big money-saver is aluminum . . . for good reasons.

1 *Low initial cost.*

Today, aluminum conduit costs no more than steel . . . an important factor to consider when figuring your bid.

2 *Lower installed cost.*

Aluminum conduit weighs only *one-third as much* as the same size steel conduit. Result: easier handling . . . less worker fatigue . . . easier cutting, threading, bending . . . faster, more economical installation.

3 *Lower maintenance costs.*

Because aluminum conduit can't rust and is highly resistant to corrosion, maintenance and replacement costs are virtually eliminated. Aluminum never needs painting, keeps its look of quality for years. Other quality features: aluminum conduit is nonmagnetic, which reduces voltage drop; non-sparking for safe use in hazardous locations.

IT COSTS LESS TO INSTALL

OF A QUALITY INSTALLATION!

10-ft. section of 4-inch aluminum conduit weighs only 34 lbs.; steel—98 lbs.

Aluminum conduit can't rust, resists corrosion—saves maintenance dollars.

Aluminum conduit is easy to work with—saves labor, time and money.

KAISER ALUMINUM

THE BRIGHT STAR OF METALS

See "MAVERICK" • Sunday Evenings • ABC-TV Network

HERE'S HOW TO START SAVING MONEY NOW...

SEE THIS MAN BEFORE YOU BID ANOTHER JOB!

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KAISER ALUMINUM
ELECTRICAL DISTRIBUTOR

HERE'S HOW TO START SAVING MONEY NOW...

The man to see before you bid on another job is your Kaiser Aluminum Electrical Distributor. Compare prices—see how Kaiser Aluminum rigid conduit can give you the competitive edge on any contract.

Your Kaiser Aluminum Distributor has a complete stock of aluminum conduit sizes and fittings—*ready right now for delivery to your job site.*

See or call him today. Ask for a free copy of the Kaiser Aluminum Rigid Conduit Brochure containing comparative weights, installation details, and all the facts you need to lower your costs.

Start saving money now!

Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California.

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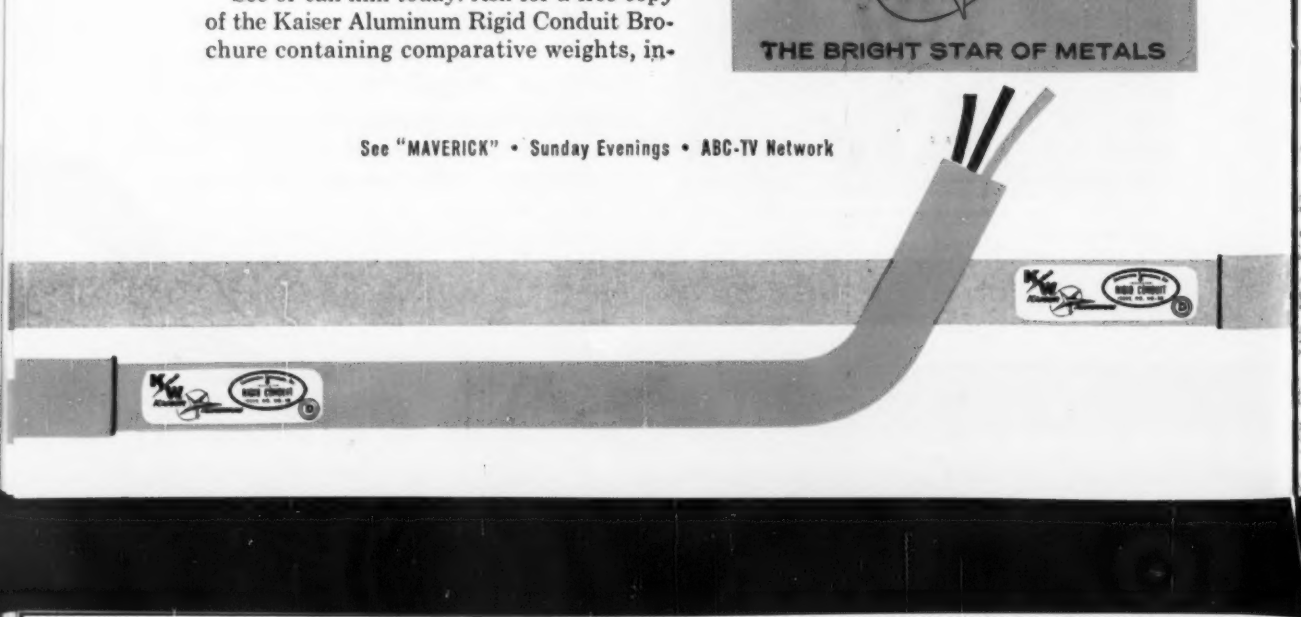


Powercasting Program

(*Continued from page* 92)

using Powercasting for a complete longrange system study, many smaller studies can be made on subjects such as generator shutdown economics and production costs," Dillard said. "These separate studies are more practical for many utilities than the complete system study.

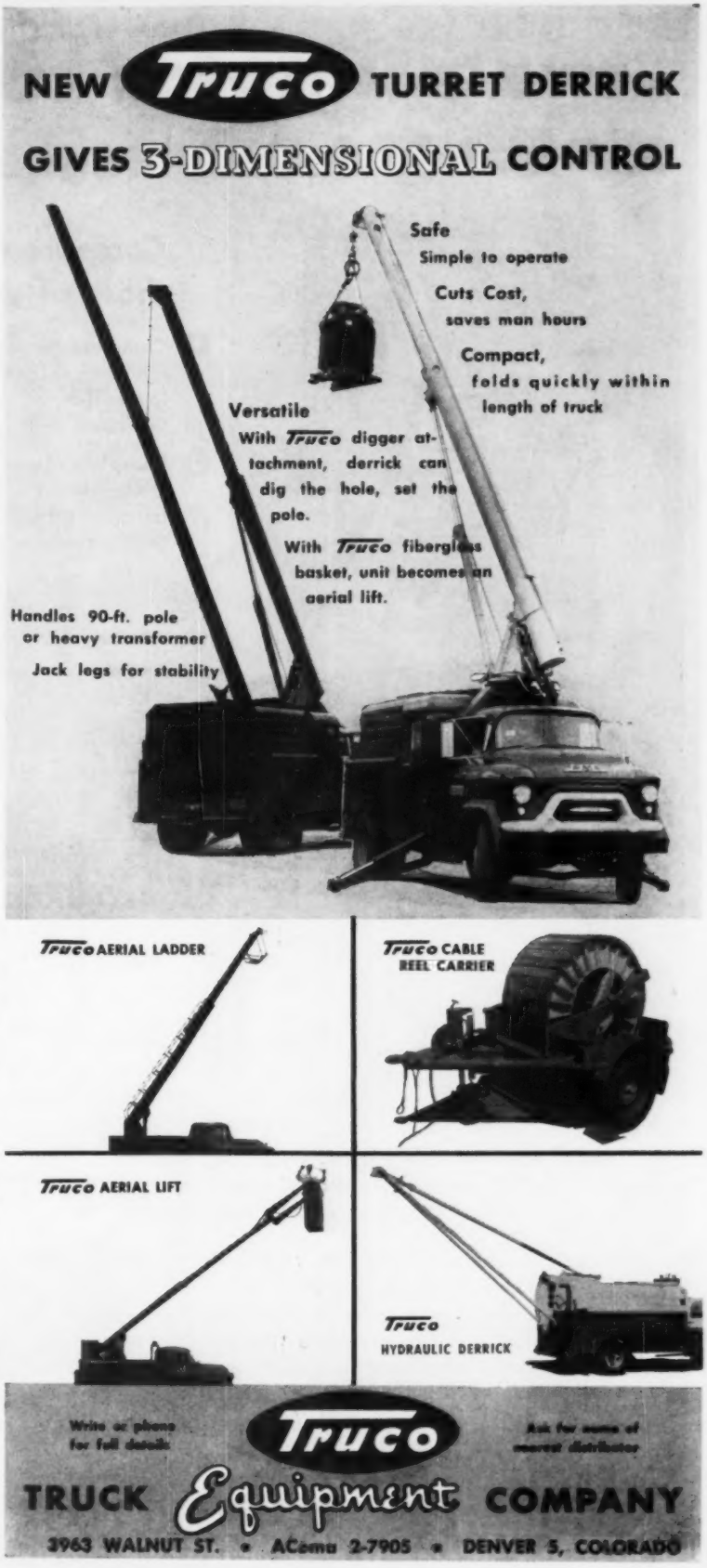
"Early and accurate prediction of future capital expenditures will enable utilities to save substantially on planning, operation, and equipment —by buying the right equipment at the right time, not prematurely or too late," he added.

"The first Powercasting study is now underway for a large eastern utility. Before the study is completed, many different possible expansion patterns will be analyzed and evaluated and the best one selected. In addition, many other significant questions will be answered as byproducts of the study."

MANUFACTURERS BRIEFS

Howell Electric Motors acquires **Leland Electric,** former division of American Machine and Foundry, as wholly-owned subsidiary . . . **The Walworth Co** announces an exclusive licensing arrangement with Canada Iron Foundries, Montreal, for manufacture and sale in Canada of the Walworth industrial line of valves . . . **Industria Electrica de Mexico,** which has 40% American ownership (including 27% by Westinghouse), is embarking on a $2-million expansion program into new products. Main plant will be used exclusively for heavy electrical equipment production. The company is beginning to produce 50-Mva transformers, a Mexican "first," and plans more exports to Central America . . . Two 300-Mw steam turbine-generators have been ordered by Britain's Central Electricity Generating Board for the West Thurrock station in eastern England. **Associated Electrical Industries** is building them for a total of $14 million.

(*More Procurement & Products, p*100)


NEW Truco TURRET DERRICK
GIVES 3-DIMENSIONAL CONTROL
Safe
Simple to operate
Cuts Cost,
saves man hours
Compact,
folds quickly within
length of truck
Versatile
With Truco digger attachment, derrick can dig the hole, set the pole.
With Truco fiberglass basket, unit becomes an aerial lift.
Handles 90-ft. pole or heavy transformer
Jack legs for stability
Truco AERIAL LADDER
Truco CABLE REEL CARRIER
Truco AERIAL LIFT
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Write or phone for full details
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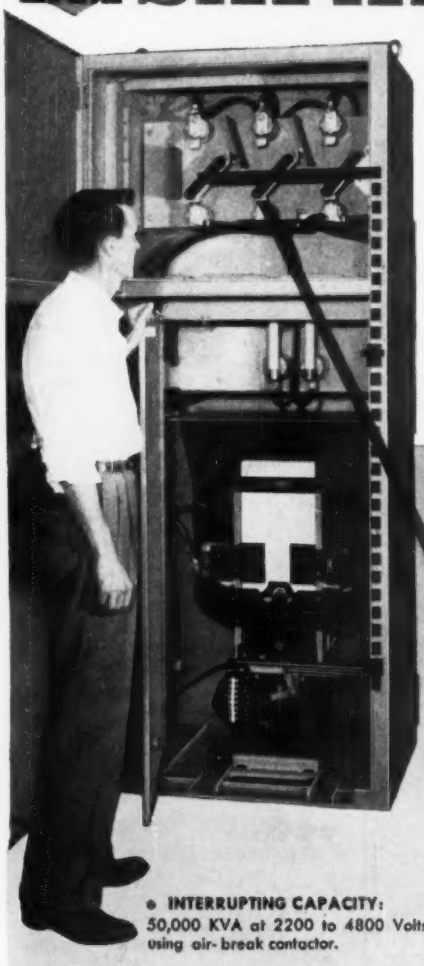
For those who think twice about

TWO E-M MOTOR CONTROL LINES

E-M SAFAIR Magnetic Control (NEMA CLASS E-1)

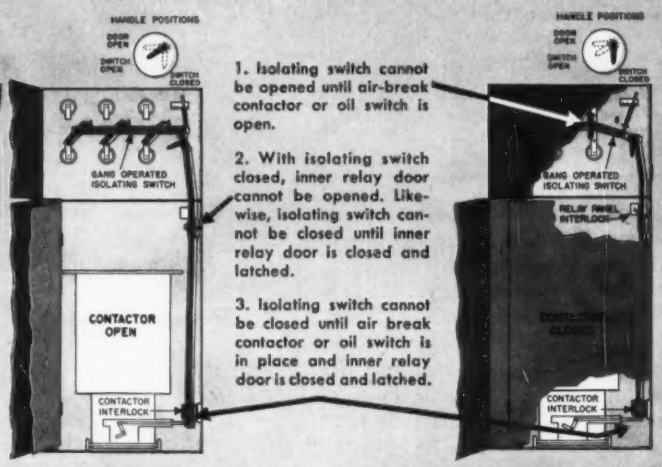


• **INTERRUPTING CAPACITY:** 50,000 KVA at 2200 to 4800 Volts, using air-break contactor.

Compare these features with those of your present controls

1. **Complete Personnel Safety** with a foolproof system of mechanical interlocking between gang-operated isolating switch, oil switch or air-break contactor, and compartment doors.
2. **Complete Motor And Control Protection.** Skillfully engineered and applied components are carefully coordinated to protect both motor and control over complete design range of overload and fault conditions.

You can't make a mistake with the E-M Mechanical Interlock!

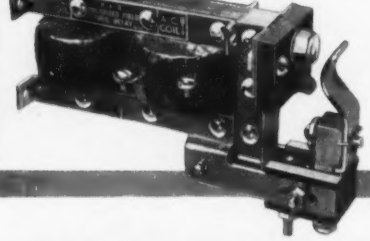


1. Isolating switch cannot be opened until air-break contactor or oil switch is open.
2. With isolating switch closed, inner relay door cannot be opened. Likewise, isolating switch cannot be closed until inner relay door is closed and latched.
3. Isolating switch cannot be closed until air break contactor or oil switch is in place and inner relay door is closed and latched.

E-M SAFETY-GANG ISOLATING SWITCH of SAFAIR Control is externally operated, internally interlocked as detailed in color and diagrams above, right.

SAFAIR features a 50,000 kva (NEMA Class E-1 maximum rating) air-break contactor suitable for repetitive motor starting and rapid switching in a complete line of squirrel-cage and wound-rotor induction motor controls and synchronous motor controls.

PFR* for Simple, Reliable SYNCHRONOUS MOTOR CONTROL



Safair- and Safuse-controlled synchronous motors pull into step smoothly and powerfully every time. E-M-invented *Polarized Field Frequency Relay system of synchronous motor

3300-TPA-2189

ELECTRIC MACHINERY

Originators of the safety-gang

their men and motors...

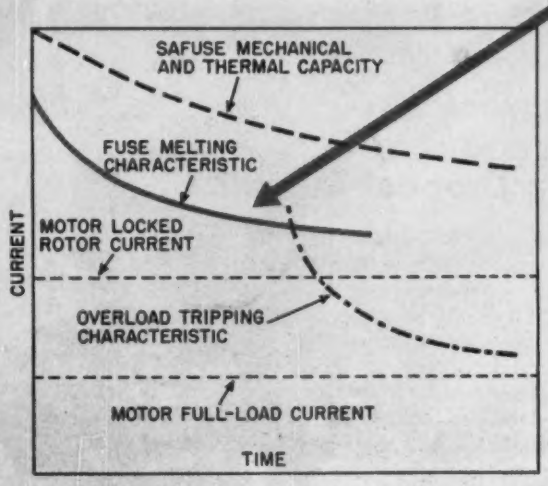
OFFER COMPLETE PROTECTION!

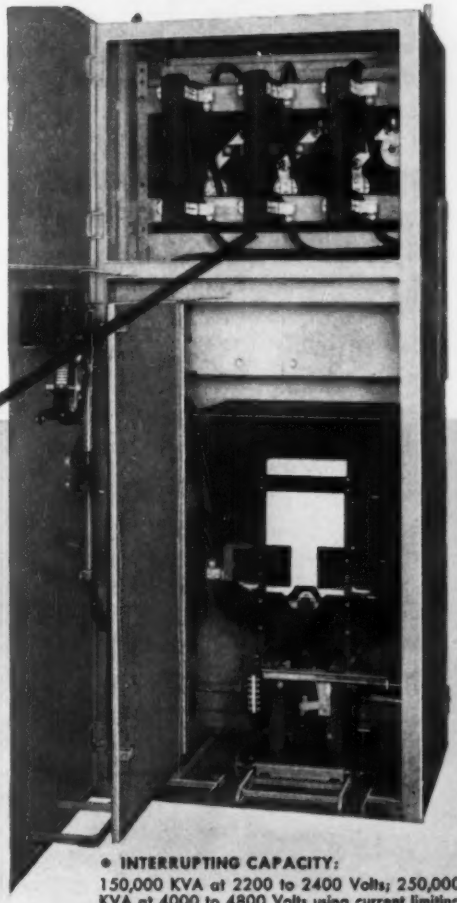
E-M SAFUSE Magnetic Control (NEMA CLASS E-2)

3. **Complete Front Accessibility.** Controls may be placed in rows, back-to-back or back-to-wall—no access required to back or sides.

4. **Complete Space Utilization.** Imaginative E-M engineering has provided a highly compact control design without compromise on safety or performance, and with provision to accommodate modifications.

5. **Complete Modification Line.** You can tailor the control to fit your exacting requirements—nearly 100 options and special features available.





• **INTERRUPTING CAPACITY:** 150,000 KVA at 2200 to 2400 Volts; 250,000 KVA at 4000 to 4800 Volts, using current limiting fuses with air-break contactor or oil switch.

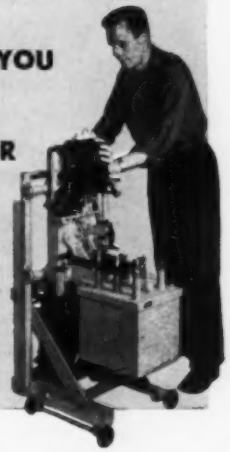
starting and synchronizing is sensitive to the electrical condition of the field winding, applying field excitation at proper rotor angle for maximum synchronizing torque with minimum current inrush . . . and it's coupled with E-M's modern field failure protective system.

FAST ACTING FUSES *plus* E-M Safety-Gang Isolating Switch in SAFUSE are the best possible combination for complete motor and control protection thru NEMA Class E-2 maximum ratings. The current limiting fuses provide short circuit protection and are carefully coordinated with overload relays as shown in diagram above.

Complete information and helpful application data are available from your E-M Field Engineer. Call him and write the factory for publications 242A and 249.

SAFUSE GIVES YOU CHOICE OF AIR-BREAK CONTACTOR OR OIL SWITCH

For highly repetitive duty use the roll-out air break contactor. But for less frequent starting—or in areas of severe dust, dirt, moisture, or corrosive fumes—the roll-out oil switch is recommended.

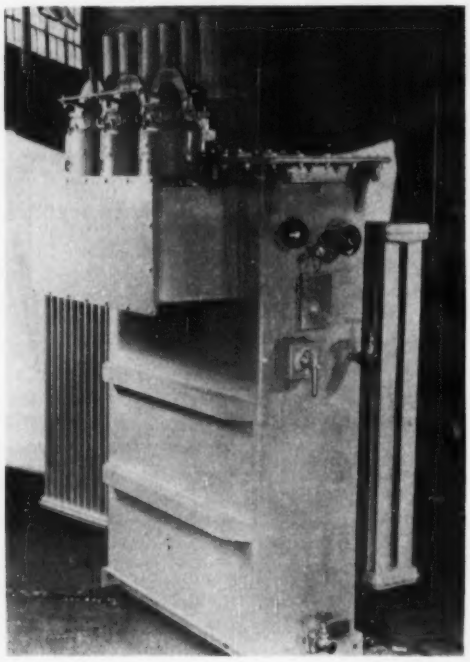


MFG. COMPANY MINNEAPOLIS 13, MINNESOTA

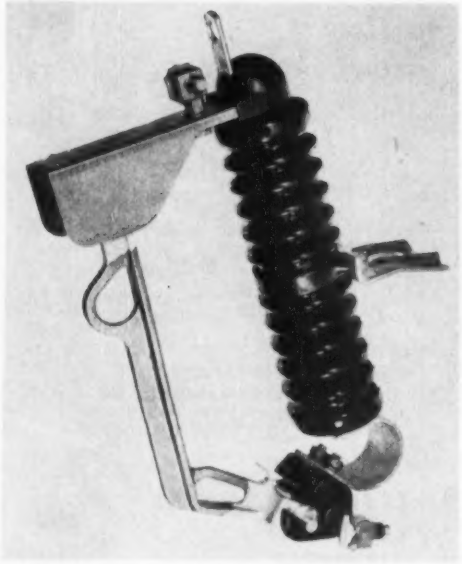
disconnect high-voltage fused control

(For further information refer to Readers Service on page 102)

Unit Substation . . .



. . . transformer has dual secondaries. The liquid-immersed unit has low voltage connections for 480-Y/277 v with taps at 208-Y/120 v. High voltage connections on the transformer are at 4,160 v delta with four taps below. High voltage is brought out to a terminal compartment, on which gang-operated oil fused cutouts are mounted. Transformers are available in sizes from 225 to 3,000 kva, at voltages up to 69 kv.
Queensboro Transformer & Machinery Corp, 115-25 Fifteenth Ave, College Point, N. Y.



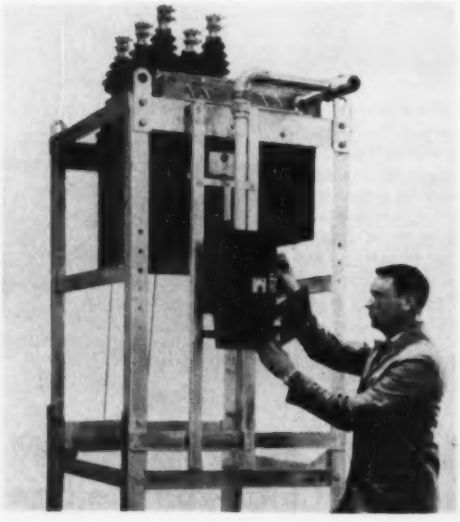
Open Dropout Cutout . . .

. . . has a solid blade and serves as a disconnect switch. Use of the solid blade in the 100-amp cutout base gives the device a 200-amp rating. A switch of this type has a momentary rating in excess of 2,500 amp. The combination provides an economical 200-amp disconnect switch in the distribution voltage class. A fuse holder can be substituted for the solid blade should an interrupting device be required.
Hubbard and Co, 200 S Michigan Ave, Chicago 4, Ill.

Substation Frame . . .

. . . for PR recloser is now available. Recloser height is easily adjusted over a wide range without special equipment. A movable upper section, which slides into the fixed lower section, permits selection of any height between 83 and 113 in., floor to bushing tip. The tank lifter, which uses a geared windlass, can easily be changed from one unit to another by removing two bolts.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

(*More New Equipment on page* 102)

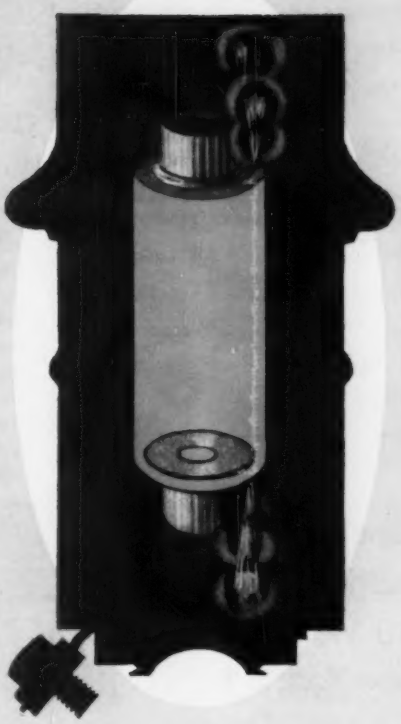


AUTOGAP ARRESTERS *with the exclusive*

"Magic Cylinder"

Also Makers of the EHD Faultmaster Cutout

... offer the unique combination of
LONG SERVICE LIFE
and
SUPERIOR PROTECTION
with
UNCHANGING CHARACTERISTICS



Here is an outstanding combination of performance features that have been thoroughly proven in the field.

SUPERIOR PROTECTION in the Hubbard AUTOGAP arrester means *proper sparkover with negligible discharge voltage*—negligible with even the highest of lightning discharges.

LONG LIFE *without measurable electrical wear* is a matter of record with users who have "kept score" on the AUTOGAP.

Your Hubbard representative will be glad to supply you with full information. Call him today.

BETTER PRODUCTS *through Creative Engineering*

HUBBARD

AND COMPANY • 200 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

Manufactured in Canada by the N. Slater Company Hamilton, Ontario

LIVE BETTER ELECTRICALLY

Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Queensboro .....Transformers ☐
Hubbard .....Cutout ☐
Westinghouse .....Frame ☐
Chance .....Lift Stick ☐
Gould-National .....Batteries ☐
Westinghouse .....
.....Ultrasonic Generator ☐
Utility Body.....Ladder ☐
Dietz .....Light ☐
Federal Pacific .....Breakers ☐

OTHER

_____

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Manufacturers Editor
Electrical World
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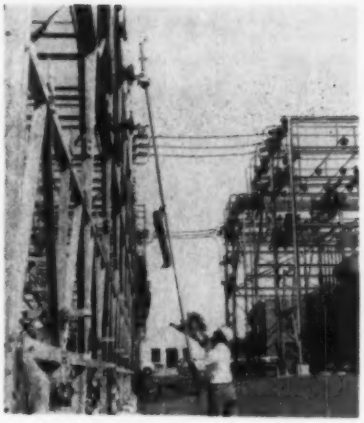
FOR:

Reference ..... ☐
Specs ..... ☐
Trial ..... ☐
Purchase ..... ☐

NOVEMBER 2, 1959



Lift Stick . . .

. . . removes and installs power fuses too heavy to be conveniently handled with a hookstick. Equipped with a system of ropes and pulleys, the Power-Fuse Lift Stick permits the operator to lower and raise a power fuse in much the way a flag is handled on a flagpole. The tool is hung on the top insulator of the fuse mounting by means of a shepherd hook attachment standard with the tool. It is available in 12, 14, 16 and 18-ft lengths.
A. B. Chance Co, Centralia, Mo.

Batteries . . .

. . . for switchgear, alarm systems, control and other applications feature a leak-proof post seal that eliminates corrosion and wet covers. A Plastrite jar, lighter in weight than conventional containers, saves 30 to 40% floor space. Kathanode batteries are available in capacities from 50 to 1,140 amp-hr.
Industrial Div, Gould-National Batteries, Inc, Trenton 7, N. J.

Ultrasonic Generator . . .

. . . line features solid state devices that reduce weight as much as 80% and size by as much as 50%. The design will be used for all units in a line with cleaning tanks in capacities from 1½ to 16 gal. Units include 500 and 750-w sizes.
Westinghouse Electric Corp, Industrial Electronics Dept, 2519 Wilkins Ave, Baltimore 3, Md.

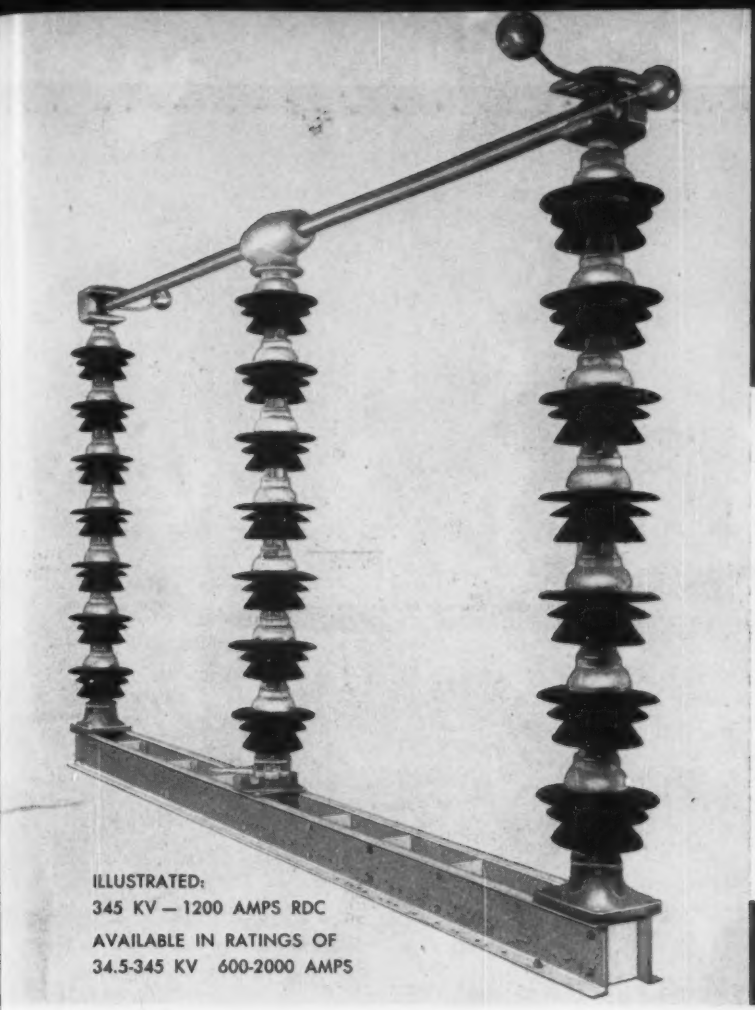
Aerial Ladder . . .

. . . is fully hydraulic. The Model LHP ladder has a steel lower section and fiberglass upper section with a wood core. Full 360-deg rotation is provided on the power takeoff driven units. Platform to ground heights of 28, 32 and 36 ft are available.
Utility Body Co, 1530 Wood St, Oakland 7, Calif.

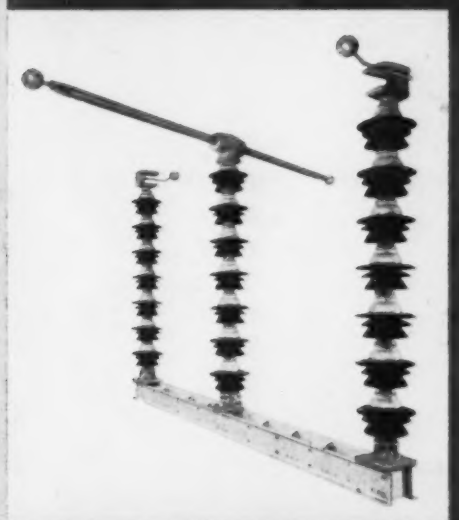
Warning Light . . .

. . . delivers 60 candle power for 650 hr. The 8-in. diameter light is

(*Continued on page* 106)



ILLUSTRATED:
345 KV — 1200 AMPS RDC
AVAILABLE IN RATINGS OF
34.5-345 KV 600-2000 AMPS



For Appearance, Low RIV, and Ease of Operation Choose Southern States RDC Side-Break Switch

Certain design characteristics count heavily in the selection of air switches.

Appearance is important, especially where the switch is to be part of a modern substation. The RDC is streamlined. It has no exposed cranks, arms, or clevises to mar its smooth contours.

Radio Influence Voltage is a strong factor, especially where the switch is in an urban area. The RDC's corona-resistant lines result in RIV of less than 500 microvolts.

Ease of operation is always a prime consideration. The RDC, with the weight of the blade balanced on the center insulator, operates with ease in any mounting position.

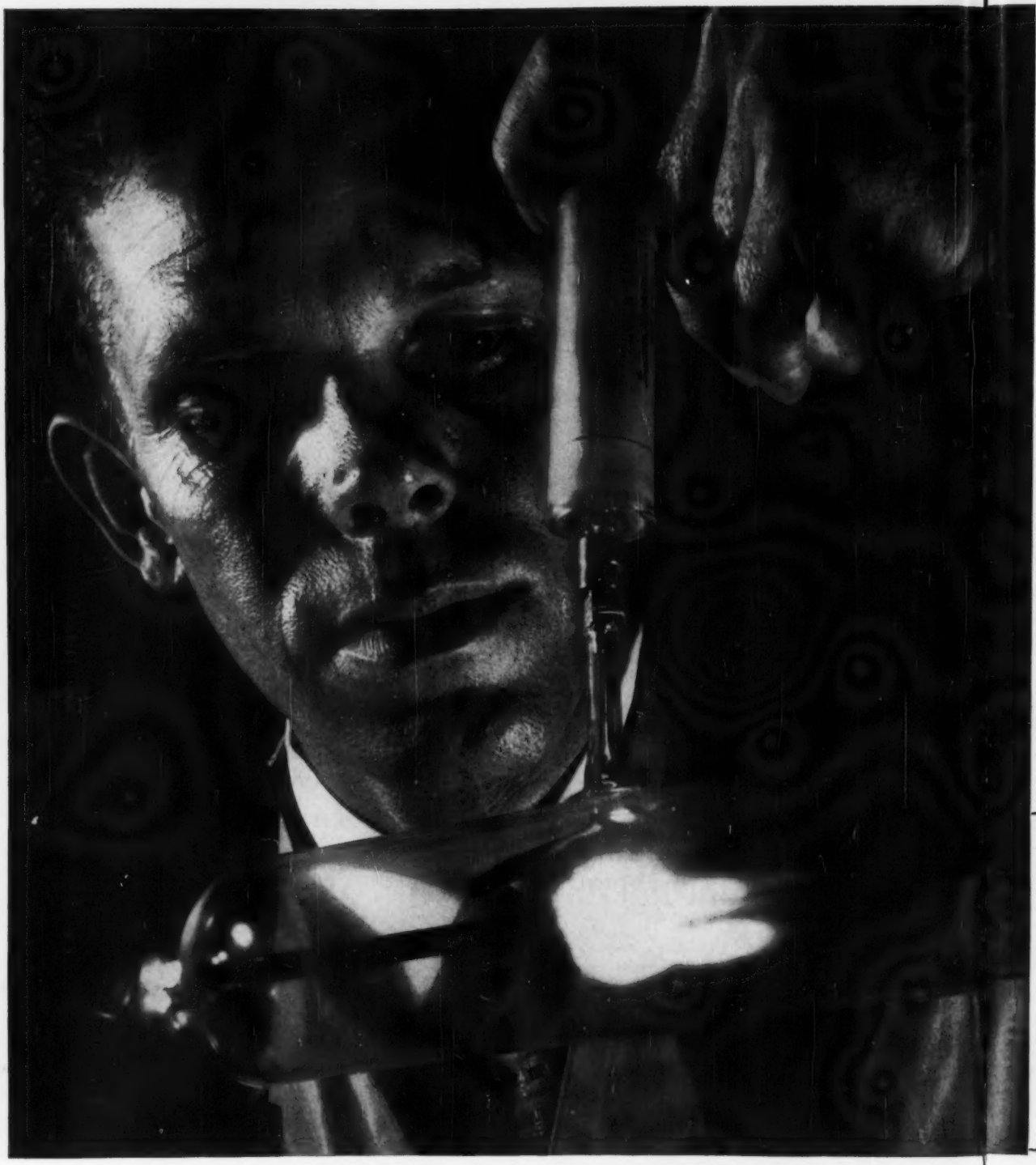
Other important characteristics of the RDC, to be considered in judging an air switch, are: Amplitact® contacts to provide maximum dependability under short circuit stress . . . resistance of exposed metal parts to corrosion . . . one-piece blade balanced in all positions . . . simplified installation . . . and quality construction throughout.

For complete details, see your Southern States representative, or write us direct for Technical Bulletin 58RDC.

LIVE BETTER ELECTRICALLY

IN CANADA:
Dominion Cutout Co., Ltd., Toronto

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA



THIS SIMPLE DEMONSTRATION PROVES SF_6 GAS ARC-QUENCHING ABILITY

In this experiment, an arc between two electrodes in the glass tube is instantly extinguished with SF_6 gas when the plunger on the hypodermic needle is depressed. At atmospheric pressure, SF_6 will interrupt a hundred times more current than will air. Because it is an electronegative gas, sulfur hexafluoride quickly captures electrons from the electric discharge, effectively extinguishing the arc.

Properties of SF_6 gas as an arc-quenching medium provide the first major advance in power circuit breaker design in 20 years.

ARC-QUENCHING SF_6 GAS ...KEY TO SUPER BREAKERS

makes possible greatly improved performance from 34.5 kv to 460 kv and beyond

Discovery of the superb arc-quenching qualities of electronegative SF_6 gas has made possible sweeping circuit breaker design advances. Westinghouse breakers using this revolutionary arc-quenching medium are simpler in design, lighter in weight. They are easier to install, more economical to operate, safer and simpler to inspect and maintain than any power breaker on the market today.

Sulfur hexafluoride is highly stable. This assures long life of the gas as both a quenching and insulating medium, even with repeated interruptions. SF_6 has extremely high dielectric strength, recovers full dielectric properties rapidly . . . assures unexcelled arc extinction time after time. SF_6 is inert, nontoxic, nonflammable, odorless . . . entirely safe. Westinghouse breakers designed around the unique capabilities of SF_6 gas are ideal for *all* locations. Quiet operation is assured by the closed gas system.

Westinghouse power circuit breakers using SF_6 gas are basically new breakers. But they have proved themselves at several voltages and also promise the most practical design avenue in capacities of 460 kv and beyond.

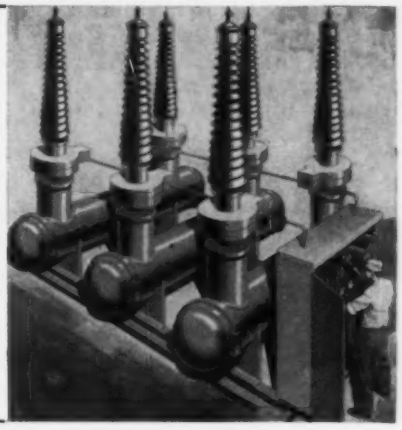
Westinghouse suggests you buy two of these new breakers in widely separated ratings and apply them in entirely different operating situations. Prove to yourself that they will give you combined performance and economy you cannot get in any other breaker.

Call your Westinghouse representative today. Or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

PROVE THE OUTSTANDING PERFORMANCE OF THIS BREAKER ON YOUR OWN SYSTEM

The principle of circuit breaker design using SF_6 gas has already been proved successful on several operating systems. Breakers from 46 kv to 115 kv have now completed over two years of service.

With SF_6 breakers you get: FASTER INTERRUPTION; EASIER INSTALLATION; SIMPLER, LIGHTER FOUNDATIONS . . . no shock transfer during interruption . . . elimination of oil and size reduction cuts weight up to 65% at 230 kv; DRASTICALLY SLASHED MAINTENANCE . . . SF_6 does not decompose . . . routine inspection only half as frequently . . . interrupter easily removed; COMPLETE SAFETY AT ALL TIMES . . . dead tank construction; QUIET OPERATION . . . no discharge to atmosphere . . . closed system conserves gas, too. J-60967



YOU CAN BE SURE...IF IT'S Westinghouse

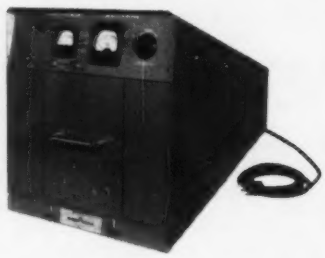
WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

Pick Your Own Standard

We're not sure just what an exact, international, standard foot-candle is. (That Japanese trainman's lantern up there might be it for all we know.)* What we do know is that when you can set every last photoelectric control in your system to turn on at the *same* light level—by using *one* calibration source—then you've got something. Standardization is then not a question of digging up 3.1416 foot-candles somewhere, but successfully getting the whole street-lighting system to work at the light level you want it to—or according to a desired burning hour schedule.

The solution we offer is the Series 6100 Calibrator. It will do the job accurately and quickly and costs less than comparable types or what you'd probably spend building one yourself. The Calibrator is small enough to sit on a bench or be carried around. The most important parts are a pair of Weston photocells matched to a microammeter that reads in foot-candles. A choice of five interchangeable "front doors" takes care of all control mounting styles you may have.

This calibration box also helps pay its way in acceptance testing of controls, recalibration after repair and basic troubleshooting. We've used a number of them in our own plant for some time now, to calibrate several thousand controls.



The price of the 6100 is about $400. A bulletin is available on request. The Fisher-Pierce Co., 82 Pearl Street, So. Braintree 85, Mass.

*Liberated in 1945 by an F-P engineer.

FP

FISHER PIERCE

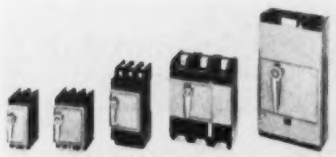
PHOTOELECTRIC LIGHTING CONTROLS

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.

Warning Light . . .

(*Continued from page* 102)

equipped with a single face parabolic reflector lens. Flash rate of the No. 680 Flasher Unit is 65 per min. **R. E. Dietz Co, Dept P, Syracuse, N. Y.**



Circuit Breakers . . .

. . . for low voltage applications feature integral rotary handles. The molded case breakers in the new line include 15 to 100-amp 480-v EF frame breakers, 15 to 225-amp 600-v F frame breakers, 70 to 400-amp 600-v J frame breakers, and 125 to 800-amp 600-v M frame breakers.
Federal Pacific Electric Co, 50 Paris St, Newark 1, N. J.

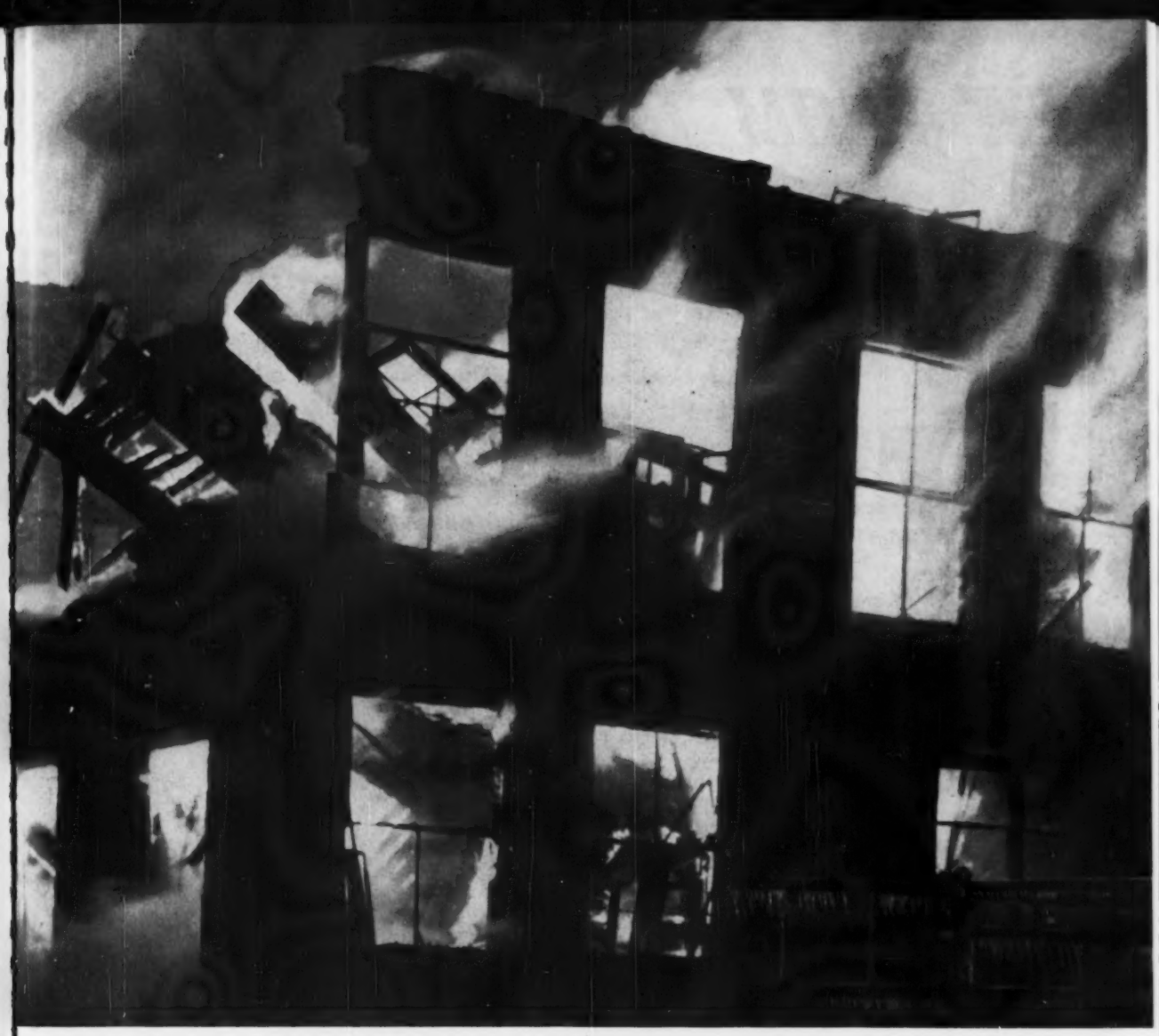
More New Products

Pulling and lifting device, Power-Pull, supports duct, pulls pipe and performs other construction functions. It is offered in ¾, 1 and 1½-ton capacities.—American Gage and Mfg Co, Dayton 1, Ohio.

High temperature **potting compound** is heat conductor and electrical insulator. Temperature range is from −65F to +1,500F.—Orell, Inc, Box 527, South Gate, Calif.

High intensity **stroboscope** covers all speeds from 60 to 15,000 rpm. Accuracy is ±1% on the high range. It operates from 115 v.—Herman H. Sticht Co, 27 Park Place, New York 7, N. Y.

Hydraulic-magnetic **circuit breaker** is unusually compact for 200-amp rating. Known as the SE33, it is a 2-pole breaker using the company's Companion-Trip feature.—Heinemann Electric Co, Trenton, N. J.



Fires of electrical origin cost an appalling $150,000,000 each year.

RIGID STEEL CONDUIT
protects electrical wiring permanently!

The best way to avoid risk is to specify rigid steel conduit for your electrical raceways. With more than 50 years of service in all kinds of installations, steel has proved its ability to combat the hazards inherent in any wiring system: open circuits, short circuits, and induced circuits.

RIGID STEEL CONDUIT has *strength* and *toughness*. It protects the wiring from physical damage both during and after installation.

RIGID STEEL CONDUIT has *good conductivity* and *positive coupling design*. It grounds out induced currents without danger.

RIGID STEEL CONDUIT has *over-all economy*. Low original cost, low installation cost, long trouble-free service.

Protect your wiring — protect your buildings — permanently. Be sure it's *rigid steel conduit!* Your steel conduit distributor can give you full details.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

NEW FROM DODGE FOR 1960

The thriftiest trucks, in the widest tonnage range, Dodge has ever built . . . including totally new cab-forward models with diesel or gasoline engines.

Name your job. There's a Dodge truck to do it. For Dodge has never had a line-up as great as this new 1960 truck platoon. Spirited panels and pick-ups that deliver up to 200 horsepower. Rugged stakes with up to 19,500 lbs. G.V.W. Husky 4-wheel-drive models with wheelbases from 108″ to 174″. All these and more make Dodge your smartest choice for efficient, low-cost hauling. And in the heavyweight class, Dodge introduces a completely new line of cab-forward models, trucks engineered to put real muscle into your biggest jobs, trucks whose new Servi-Swing fenders open with a simple latch and allow you to walk right up to the engine! See your Dodge dealer. He'll be pleased to give you the full Dodge truck story for 1960.

DEPEND ON **DODGE** TO SAVE YOU MONEY IN **TRUCKS**

A PRODUCT OF CHRYSLER CORPORATION

"JOB-RATED" FROM 4,250 LBS. G.V.W. TO 76,800 LBS. G.C.W.

SWEPTLINE pick-ups head their class in looks; lead in load space, power. 4-wheel-drive optional.

FORWARD-CONTROL chassis put famous Dodge dependability under the body of your choice.

VAN and other special bodies are easily accommodated by most 1960 Dodge trucks.

TRACTOR models with compact new 89¾" BBC pull longer trailers, bigger legal payloads.

STAKE bodies from 7½′ to 14′ are built by Dodge on models to 19,500 lbs. G.V.W.

TANDEM units provide top hauling strength for dump and other extra-rugged operations.

Renovated Apartment House Has 400-Kw Load

Colonial-style exterior, all-modern interior, and electric living too, are in store for future dwellers in a recently renovated Chicago apartment building.

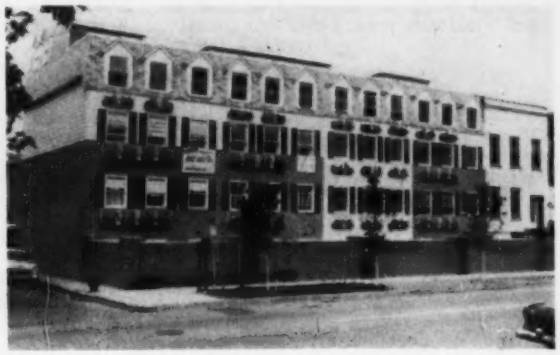
Each unit is equipped with electric radiant baseboard heating, air conditioning, 100-amp wiring, and copper hooded mosaic-tiled electric fireplace. Each all-electric kitchen has a built-in oven and range unit, refrigerator, and water heater.

The 100-amp distribution centers in two-bedroom duplex units furnish thirteen 240-v circuits, a heavy-duty kitchen appliance circuit, and 24-v feeds for the electric range, water heater and air conditioner.

Garden walks and approaches to the apartments are "snow-proofed" with buried electric cable. The living room of each apartment overlooks a rear courtyard with a landscaped garden.

Total load for the building is 400 kw.

Future projects of the builders include a 28-apartment cooperative and a 50-apartment high-rise building. Both of the projects will be all-electric.



Consumers Want Better Lighting, Midwest Utilities Told

There is an enormous potential market in residential lighting, "one of the lowest saturation markets in American business," Ted Cox, managing director, American Home Lighting Institute, told the Missouri Valley Electric Assn Conference recently. Every survey indicates that consumers want more and better lighting; the result is that more than 80% of our homes are "shamefully" underlighted by even the lowest standards, he said.

But there is a bright side, Cox noted. The Light for Living program of Edison Electric Institute, supported by utilities, lamp and fixture manufacturers, distributors, and dealers, is a powerful promotion of the home lighting market.

Cox said that the industry goal is for an average of 26 fixtures in the home. This compares with the present 12, and nine as of four years ago.

To show that home lighting is a profitable load now and may become increasingly more profitable, Cox quoted from a recent study made by an EEI committee.

Findings included:

- Home lighting is becoming increasingly off-peak load to the electric utility. Throughout the South it is already off peak, and the trend is northward
- Home lighting kwhr use has grown over the years, but not nearly as rapidly as it should in light of improvements in the art of lighting
- Modern home lighting has not been sold to the consumer. If it is sold properly, lighting use per customer could be doubled by 1965, up from the present 700 kwhr per year
- Home lighting is a stable load, generally the last to be affected by economy downturns

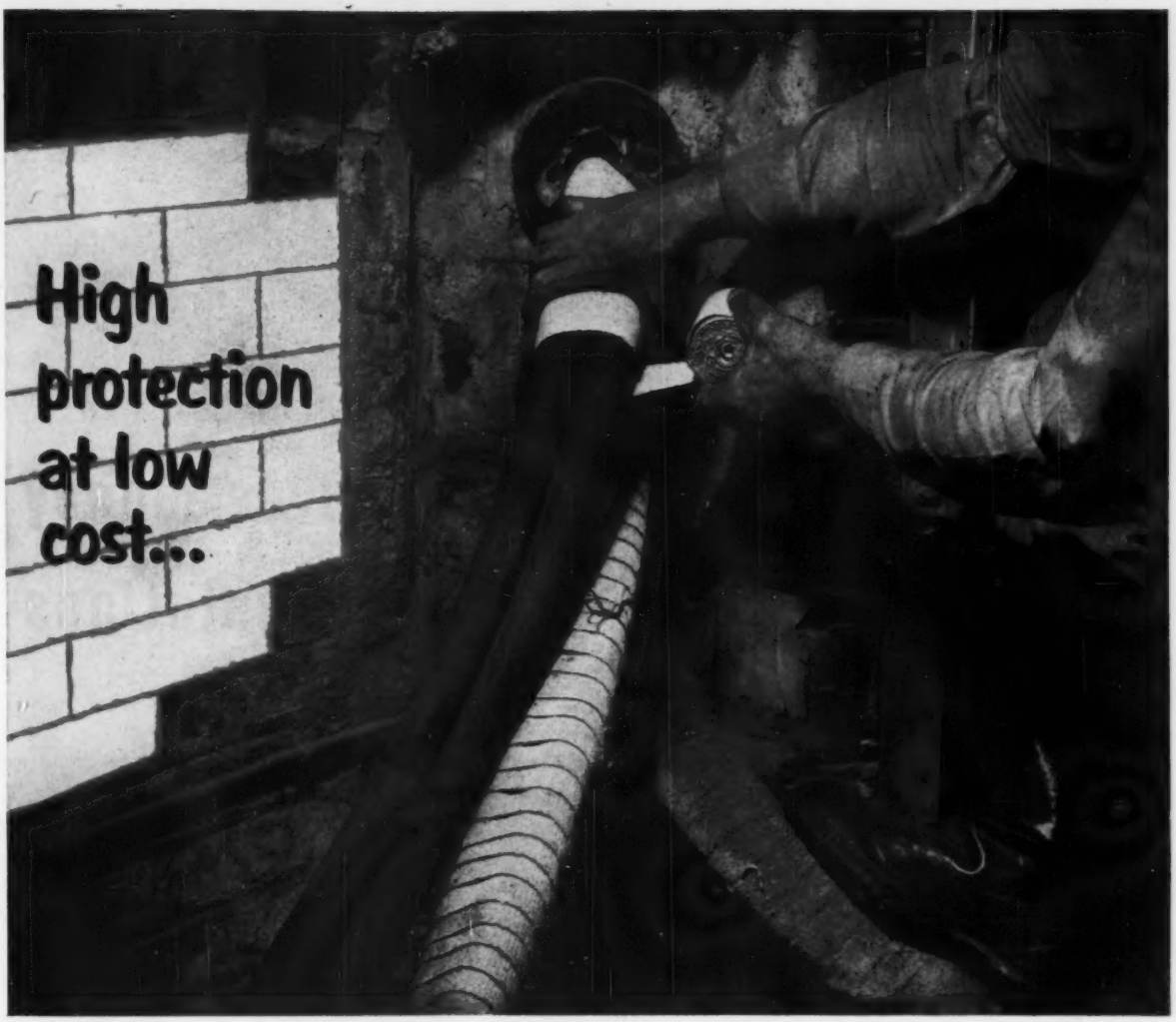
Promotion Costs Decrease

- Home lighting can be promoted successfully at reasonable expense. Three-year tests by two utilities show costs tend to decrease to less than fifty cents per dollar of annual revenue as the full impact of the program if reached
- Well-organized home lighting programs generate strong ally support and improve trade ally relations
- Improved public relations comes from home lighting promotions; customers feel something tangible and worthwhile is being done for them when the utility offers home lighting counseling
- Since all residential customers are prospects, sales programs are an excellent way to make contact with the entire group
- There is no service problem with home lighting.

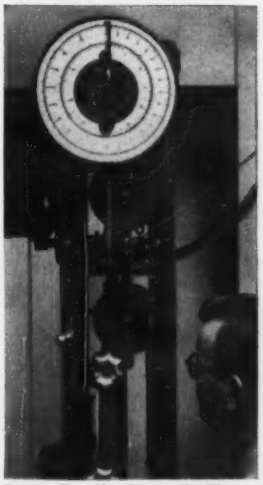
Promotion and salesmanship is needed, Cox urged, to get to the vast potential market. "We must put millions of dollars worth of promotion and direct salesmanship into this market to get tens of millions of dollars out of it," he said. "No one will argue against the axiom that you have to spend money to make money. Everybody—utility manufacturer, distributor, contractor—must pick up his share of the tab by recruiting and assigning the best merchandising and selling talent, and by appropriating bigger funds for advertising, promotion, and consumer counselling."

Sell consumer benefits, he said. Sell architects, builders and consum-

(*Continued on page* 114)



J-M No. 55 Cable Fireproofing Tape helps contain blowouts—isolate trouble



Scott Tensile Strength Tester proves J-M No. 55 Cable Fireproofing Tape maintains its high strength even after burnout.

Reduce the danger of arc multiplying your troubles in the event of cable failure. Repeated tests prove Johns-Manville No. 55 Tape helps contain arc and splash . . . and retains substantial strength even after being burnt out!

Leading public utilities have chosen J-M No. 55 for its long-range economy plus its dependability. In addition to exceeding their protection requirements, it saves time and money because it costs less to apply. It goes on faster because it's applied *dry*, wraps easily even in confined spaces.

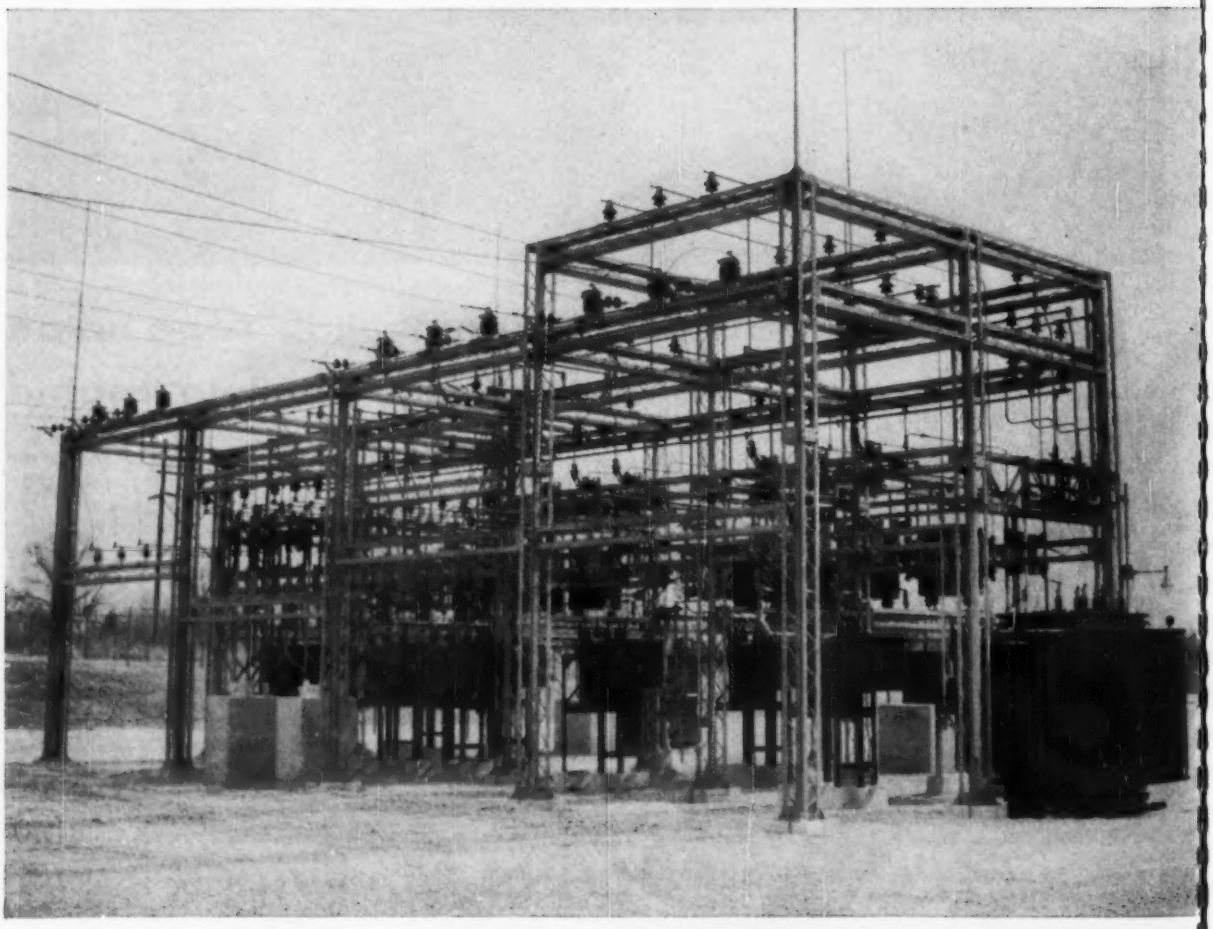
J-M No. 55 protects cables for years under manhole conditions because of top quality asbestos construction and thorough impregnation with silicone. Produced by J-M in an economical thickness, it is high in water repellence, low in water absorption . . . resistant to flame, heat, oil, fungus and mold . . . nonsagging . . . abrasive-resistant. The selvaged edges keep ground water out . . . and threads cannot pull out.

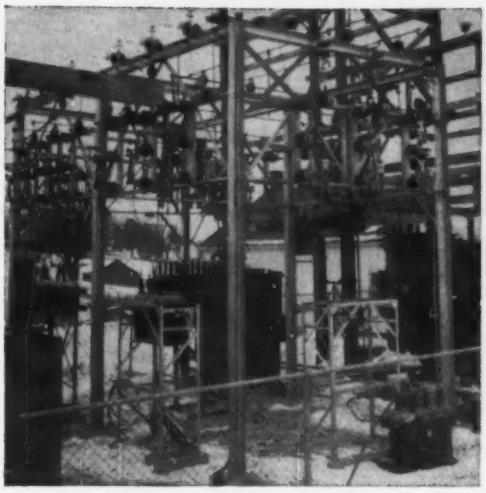
For complete details, and test data on J-M No. 55 Cable Fireproofing Tape, write for new brochure TX-6A. Address, Johns-Manville, Box 14, New York 16, N. Y. In Canada: Port Credit, Ontario.

JOHNS-MANVILLE

JOHNS MANVILLE JM PRODUCTS

Steel construction saves money in large or small substations





Small substation built economically with about three tons of USS Galvanized Structural Steel. Owner, Wisconsin Power & Light Company. Wood beams in background will be replaced with structural steel.

Galvanized Structural Steel is the ideal material for substations of any size—whether they are individually designed or prefabricated. The big savings are in the low cost of the steel. Erection costs vary only slightly for different metals because in any case the contractor has to have a crane available.

Designers and fabricators are familiar with structural steel. It's a proven material. You save engineering and construction time in addition to the low original cost of materials.

Low Maintenance Cost. Galvanized structural steel assures long-lasting and trouble-free service due to the corrosion-resisting properties of the reliable coating. Thirty years and more of unattended service has been recorded on substation structures built of this dependable product—with the plus value of neat, attractive appearance.

Structural steel is readily available. New facilities have been built by U.S. Steel for manufacturing all the necessary shapes and plates. Fabricators usually keep them in stock. When you need a substation in a hurry—specify steel! For more information, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS is a registered trademark

Large substation built for the Columbus and Southern Ohio Electric Company using about 60 tons of USS Structural Steel. Sections were prefabricated for quick erection and, to assure long life and pleasing appearance, galvanizing was done after holes were punched.

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

Consumers Want Better Lighting, Midwest Utilities Told

(Continued from p 110)

ers on the ultimate consumer benefits of good lighting and hammer home the negative results of living and working in the "gloom of poverty lighting," Cox stated. He mentioned the living room, bedroom, bathroom and kitchen as four rooms which are vastly under-lighted.

Four things are needed for a proper selling job, Cox said:

1. Inform architects, decorators, builders and consumers of the need
2. Show good lighting to sell it, through display lighting fixtures, showrooms, model homes, lighting shows, and in show windows
3. Train lighting consultants
4. Get basic standards to guide those people mentioned above.

He noted the many promotional materials which are available now and will be available in the future. "Let us look forward to the day when everybody in the lighting industry, both residential and commercial and industrial, will get together behind a single, dynamic program to light up the nation's homes, offices, schools, stores, and factories," he concluded.

Electric Unit Ventilators Installed in Indiana School

Electric unit ventilators which provide continuous and individual classroom ventilation have been installed at the Eastward Elementary School, Wabash, Ind.

The ventilators with automatic control provide heat, ventilation and natural cooling as dictated by the school room needs. Units are located in individual classrooms, making it possible to adjust temperature in each room.

"At the Eastward School, the installation of electric unit ventilators was economically justified," according to John Chapin, development engineer, John J. Nesbitt, Inc, manufacturer of the units.

"This modern school is being built in steps, with only five sections finished and as many as ten to be added. As the additional sections are built, the system can be extended with little expense. The only requirements are the purchase of additional units and the extension of the wiring," he said.

Safety features built into the unit include a disconnect switch that automatically cuts off power to the unit when the front disclosure is removed. Maintenance is limited to annual oiling and cleaning or replacement of filters.

According to Chapin, experience indicates that even on the coldest days classroom cooling is required more often than heating. "This is because heat generated by the students, the lights and direct or reflected sunlight more than offset the heat losses of the room," he said. "Consequently, electricity for heating the Eastward School is needed primarily to take the chill off the room in the mornings before school and on cold, sunless winter days. One 20-kw unit was installed per room to meet these requirements."

The unit is placed along an outside wall, usually under a window. A port in the unit allows outside air to be drawn into the unit ventilator and mixed with room air. This air is then blown over the heating elements and discharged uniformly.

With the unit ventilator system, air is kept fresh, heat absorption and downdrafts caused by cold windows are eliminated, and in warmer weather, there is noiseless, draft-free natural cooling, according to Chapin.

Con Edison Out to Sell Electric Dryers

A $100,000 fall dryer campaign whirled into action recently at Consolidated Edison Co of New York, Inc. Revolving around the theme that rain makes things grow, including dryer sales, the campaign will run through the end of December and will be backed by newspaper ads, car cards, billboards, utility truck posters and a sales booklet, "What to look for when buying an automatic dryer."

Con Ed sales promotion manager, J. C. Murtha, noted that during last year's promotion, dryer sales went up more than ten times as much as they did nationally.—68% as against 6%. He said that out of every 100 private homes in New York City, nearly 90 have automatic washers but only 14 have dryers.

SELLING BRIEFS

Fifty billion electric lamps of all sizes and types have been produced in the U. S. in the past 80 years. That many will be manufactured in the next 15 to 20 years. General Electric Co says there are approximately 50 million wired homes in the country having 1,175 million sockets. To be adequately lighted, the homes should have three to four billion sockets. Of the 23.5 sockets in the average home, two are empty and 0.4 are filled with burned out bulbs. Instead of 21.1 live light bulbs, averaging 68 w per bulb, the average dwelling should have 60 to 80, averaging 33 w each.

Appliances are being supplied free-of-charge to home economics classrooms by the Hydro-Electric Power Commission of Ontario, municipal utilities and manufacturers. New models are available on a two-year replacement plan. The home economics teacher may choose the make, style and color.

An aluminum highway railing that contains General Electric fluorescent luminaires for roadway lighting is available from Michael Flynn Manufacturing Co, Philadelphia, Pa. Advantages are: Greater driver safety from uniform low-level light focused directly on the road; unlimited possibilities for individualized road railing design; and savings in initial cost, operation and maintenance according, to the manufacturer. The railing was first used in New Jersey's Manahawkin Causeway Bridge, (EW, May 18, 1959, p 96).

New ORANGEBURG® CA* CONDUIT *with Flush Coupling Attached!*

With no separate couplings to handle or attach on the job, Orangeburg CA lays faster, costs less to install. Each long, light length has a *flush* coupling attached at one end and a standard 2° male taper at the other end, making installation a simple, one-step operation. And, since the coupling *is* attached, there are no coupling cartons to warehouse or carry to the job.

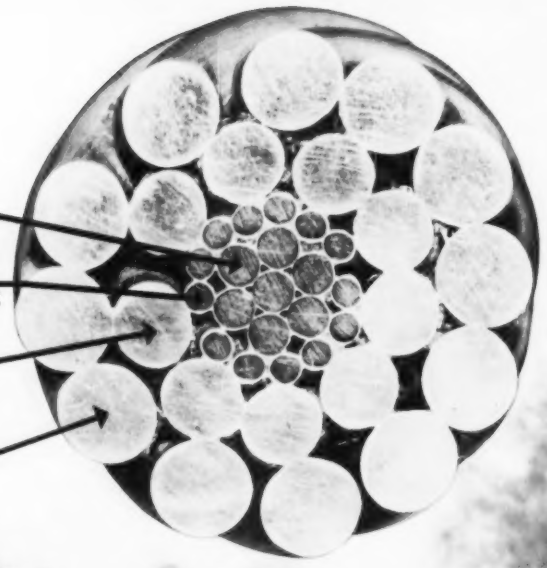
What's more, with the coupling *flush* to the conduit's outside wall, new CA is easy to stack, store and handle. The flush coupling also eliminates "staggered" joints in the trench. And that means real savings in cutting and tooling time.

Like the hundreds of millions of feet of Orangeburg fibre conduit in use since 1893, new CA has self-sealing joints and impermeable walls. Its smooth, 100% fibre raceway adds years to cable life.

New Orangeburg CA is available in 2", 3", 4", 4½" and 5" sizes. Orangeburg Standard and Nocrete Conduit, with separate sleeve couplings, are available as always. Write Dept. EW-119, for Catalog 52.

ORANGEBURG MANUFACTURING CO.
Orangeburg, New York • Newark, California
A Division of The Flintkote Company, Manufacturers of America's Broadest Line of Building Products

Orangeburg Fibre Conduit is distributed by Graybar Electric Co. and General Electric Supply Co. with branches and stocks in principal cities.

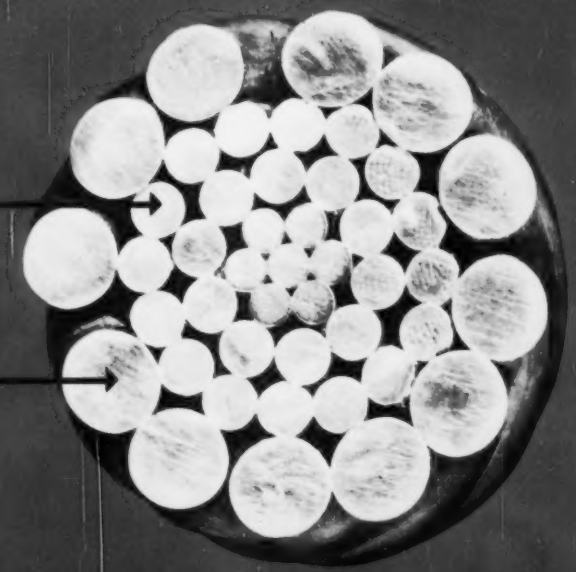


FULL TENSION SPLICE FOR ACSR CONDUCTORS

ACSR CONDUCTOR SPLICED WITH PREFORMED FULL-TENSION SPLICE

Preformed™ SPLICES

ALUMINUM CONDUCTOR SPLICED WITH PREFORMED ALUMINUM-GRIP SPLICE



LIMITED TENSION ALUMINUM-GRIP SPLICE FOR ACSR AND ALL-ALUMINUM CONDUCTORS

For The Booklet-of-the-Month "WRAP UP YOUR SPLICING PROBLEMS FOR KEEPS"

Patented — U. S. Patent No. 2,609,653; other patents pending

For full electrical conductivity

Holds full rated strength of ACSR Conductor

Resists corrosion

Compatible with cable materials

ALUMINUM FILLER RODS

GALVANIZED STEEL CORE SPLICE

"Breathe" with the conductor

Flex with conductor (EXCLUSIVE WITH PREFORMED)

Visible certainty of proper installation (EXCLUSIVE WITH PREFORMED)

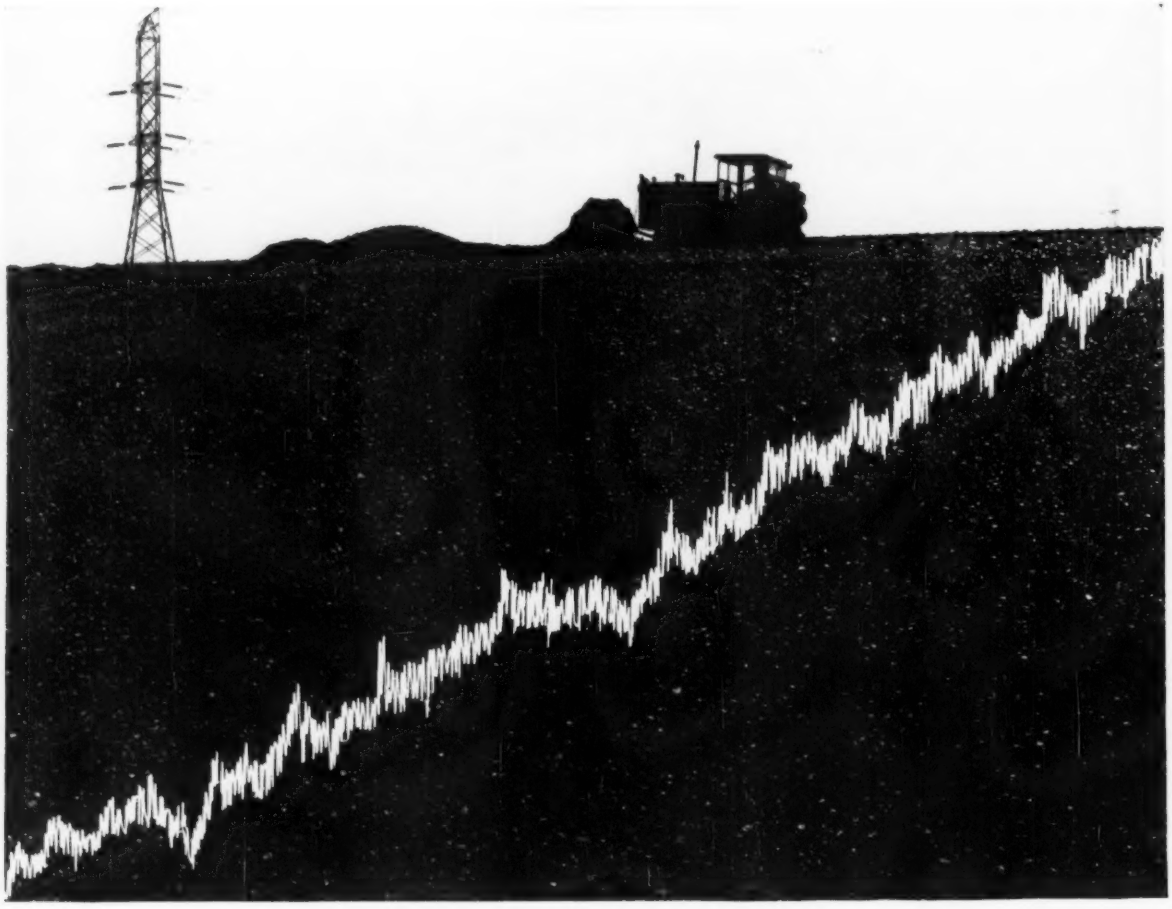
Simple application

PLP® *You can look up to Preformed™*

Write to **PREFORMED LINE PRODUCTS COMPANY**
DEPT. SP-1
5349 St. Clair Avenue, Cleveland 3, Ohio

powerful appetite!

As utilities *look* ahead and *build* ahead for a power demand in ten years double what it is today—continuity of supply and proven, available coal reserves are topmost subjects in discussions with their suppliers. A career coal company such as Island Creek with its vast reserves,* modern mining methods and scientific preparation facilities is in a position to come up with some very reassuring answers. We'd welcome an opportunity to do some looking ahead *with you.*

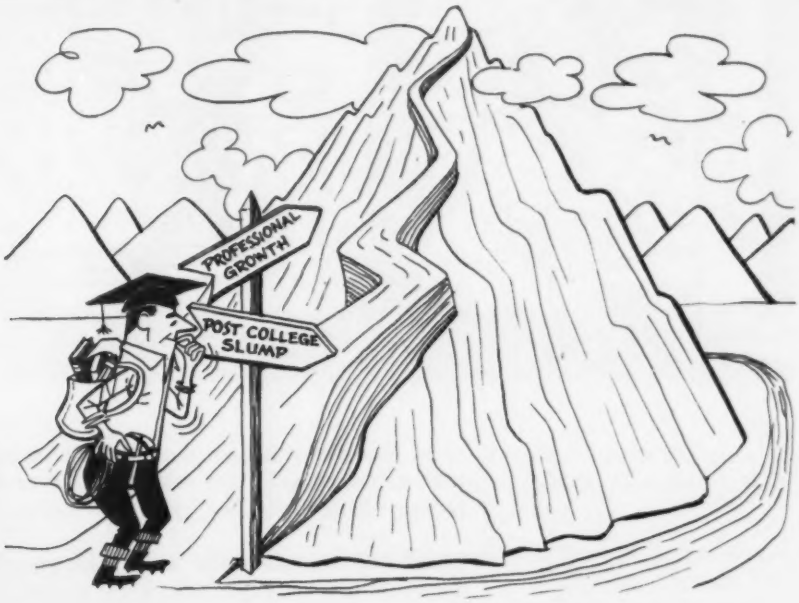


* *Island Creek's vast, proven, available reserves total more today than Island Creek has taken out of the earth in the past 50 years.*

You can depend on **ISLAND CREEK**

. . . a career company . . . dedicated to coal

Island Creek Coal Sales Company, Chafin Building, Huntington 18, West Va. • Cincinnati • Cleveland • Greensboro • Chicago • Detroit • New York • Pittsburgh



Report on
Professional Development

'First Five Years' program offers . . .

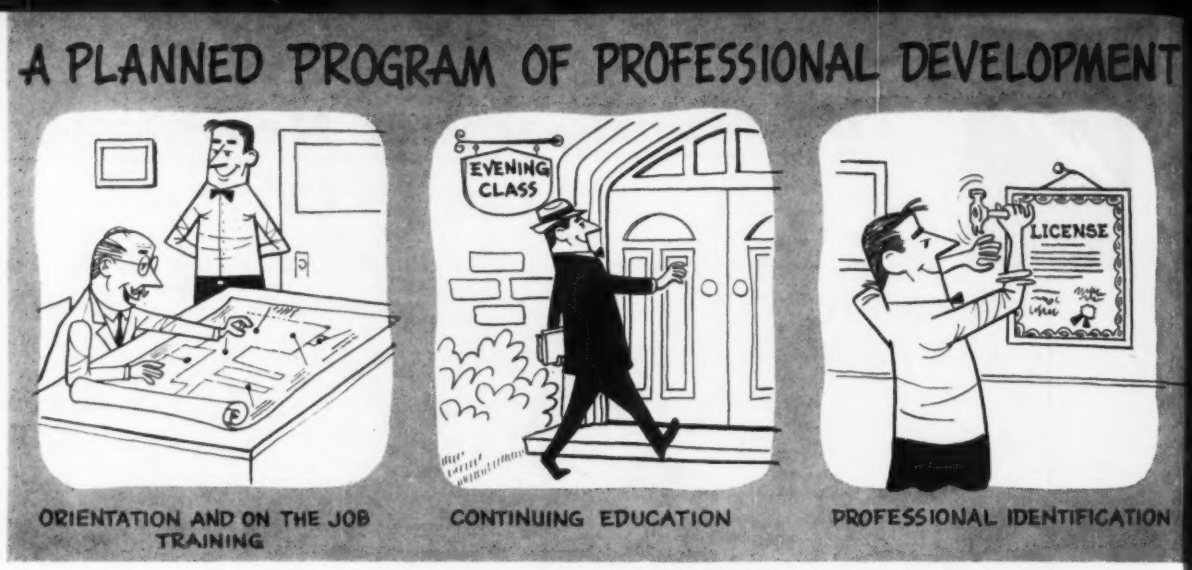
A Guide for the Young Engineer

The most critical period in a young engineer's career is the first five years after his graduation from college. In engineering school, he worked on a planned program toward a clearly-defined goal—his diploma. After graduation, however, the goal becomes less clearly defined, and too often the young engineer misses out on important opportunities to develop himself professionally because of confusion or inertia.

Preventing this "post-college slump" is the goal of the Training Committee of the Engineers' Council for Professional Development. Since 1950 the committee has sponsored the "First Five Years" program—a plan by which experienced engineers help their young colleagues to help themselves along the road to professional stature.

The "First Five Years" program has caught hold in several U. S. cities, and some electric utility companies have played leading roles in making it work in their communities. But the program has not spread so rapidly in the U. S. as its accomplishments in these cities might suggest. Engineers in Canada have been quicker to recognize its worth, and active programs are now in operation in twelve Canadian cities, with more being established each year.

The program was born at the ECPD's annual meeting in 1950, following a two-year study which showed the need for greater cooperation between business management, the colleges, and the engineering societies. This study pointed up the fact that each of the three has specific responsibilities, but that joint action is required for the best results. It recognized two cardinal principles: First, that it is up to the engineering profession to provide the right climate for a young engineer's professional development; Second, that the final responsibility for his professional advancement rests squarely on the shoulders of the young engineer himself. The committee puts it to him this way: "It is in the first few



years after graduation you must get into the habit of growing on your own as a professional man, blazing your own trail to success or mediocrity. It is your future. Which shall it be?"

ECPD put their plans into a six-point program for professional development during the first five years. With slight modifications, these six points still provide the basic breakdown of the "First Five Years" program's activities:

• **Orientation and Training in Practice.** ECPD tries to foster better orientation courses for new engineers and urges that they be kept gainfully employed from the outset of their employment. While the committee charges the young man himself to learn all he can about his field from on-the-job training, it also recognizes that the employer has a large responsibility toward getting him started off on the right foot.

• **Continuing Education.** On the thesis that "for a professional man, education never ends," the ECPD encourages formation of evening study courses—with or without credit—for young engineers. The committee made a survey of some 100 localities in the U. S. and Canada to ascertain what courses were available. Since then, the objective has been to make more available as needed.

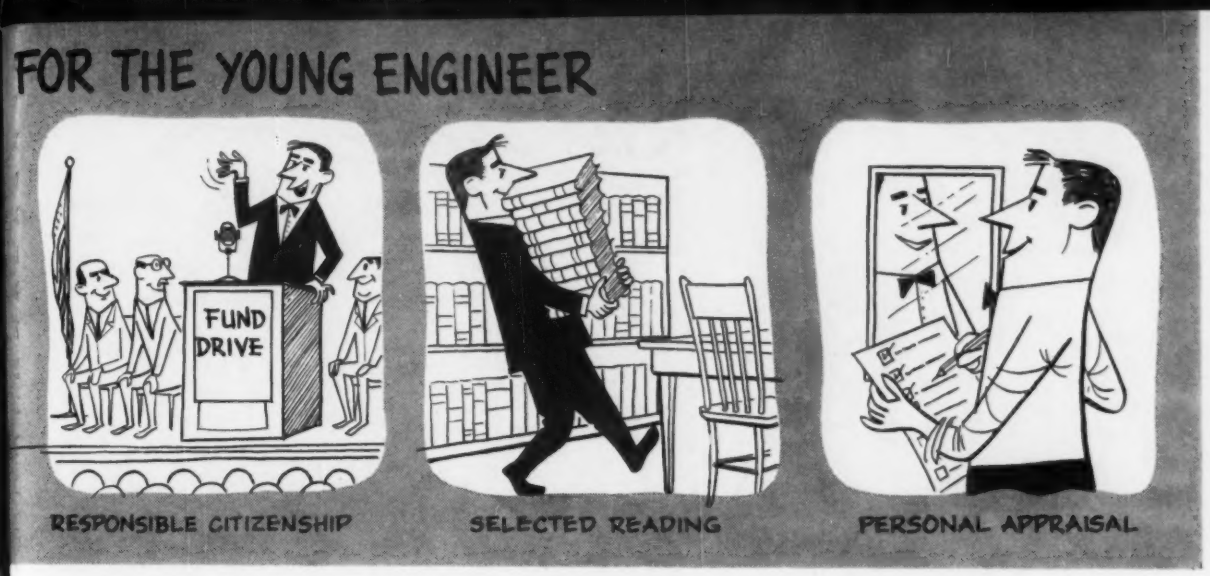
• **Professional Identification.** The young engineer is encouraged to join the engineering society that covers his branch of the profession, to participate in its activities, to seek professional registration in the state where he lives, and to conduct himself like a professional man at all times.

• **Responsible Citizenship.** The young engineer is encouraged to put his roots down in the community in which he lives, to participate in community activities, and to take his place as a respected and responsible citizen. To this end, ECPD urges established engineers to welcome him on his arrival. In some localities, engineering societies have compiled booklets providing information as to locations of churches, schools, recreational facilities, etc.

• **Selected Reading.** Recognizing that the successful engineer has to be broader than his specialty, ECPD has published recommended reading lists covering subjects ranging from physics to poetry. Local activities have also aided in providing a library of professional books.

• **Personal Appraisal.** ECPD encourages the young engineer to look at himself in order to ascertain where he stands on the road to his personal goal. The committee has prepared a questionnaire to help direct his appraisal.

The first pilot project of the "First Five Years" was set up in Cincinnati in 1952. Prominent among the nine major industries taking part in this experiment



was the Cincinnati Gas & Electric Co. A local industry committee was set up to cooperate with ECPD, and the Engineering Society of Cincinnati and University of Cincinnati rounded out the picture.

As a first step, the participants undertook a survey of the continuing education needs of young engineers in the Cincinnati area. At that time, it was found, Cincinnati offered no opportunities for part-time graduate study by practising engineers. In 1953, with the aid of the University of Cincinnati, a few basic courses were set up to accommodate the needs of the greatest number of students. In all, a total of 285 students enrolled in nine courses. Since then each year the number of courses offered and the total registration of students have risen steadily, until in the 1958-59 school year there were more than 1,000 students enrolled in 36 courses—six of them in an extension at Dayton. Recently the university has also announced a plan of graduate cooperative fellowships, which will make it possible for practising engineers to work toward a PhD degree by spending intermittent semesters on campus and in industry. Registration in the state of Ohio is encouraged by review courses co-sponsored by the Engineering Society of Cincinnati and the Ohio Society of Professional Engineers and conducted at the University of Cincinnati.

Not all the courses are in engineering. The U of C also offers evening classes in business administration and the liberal arts; Xavier University provides many liberal arts courses; and Salmon P. Chase College teaches evening classes in commerce and law. Two chartered toastmaster clubs have made available education in public speaking, and leadership training workshops have been conducted in cooperation with the Adult Education Council of Cincinnati and the Cincinnati Council of World Affairs.

In Detroit a similar project was set up in 1954, with Detroit Edison Co among the leading participants from industry. Under the chairmanship of Detroit Ed's Vp George A. Porter, a Detroit Industry Training Committee was formed with the aim of drumming up interest in professional development among employers and young engineers. A set of seven booklets published by the committee has been distributed widely, and a number of companies have established means of implementing one or more of the six points of the "First Five Years" program.

Elsewhere in the U. S. there has been spotty activity. In up-state New York, General Electric Co and Rensselaer Polytechnic Institute have recently developed a program for further education in nuclear engineering, and a Joint Activities Council made up of members of the engineering societies has been formed to undertake more activity under the "First Five Years" program. In Hartford,

Conn., Rensselaer and United Aircraft Corp have set up programs in science, engineering or management leading up to a master's degree.

In Charleston, W. Va., four projects are now in operation. Local sections of engineering societies joined with local industries to set up the Kanawha Valley Graduate Center, an extension of West Virginia University offering courses in preparation for the ME degree. And last September the societies undertook a broader program of professional development.

In Washington, D. C., the "First Five Years" program stimulated a graduate curriculum in engineering and management administration to be set up at George Washington University with the cooperation of the Department of the Navy, which supplies many of the students at their own expense. And one large company in Minneapolis has instituted a five-year orientation and training program for young engineers, based largely on information obtained from ECPD.

In Canada, the program has spread rapidly. With twelve active branches in as many cities, the Professional Development Program (as it is called there) recruited almost 1,000 new participants last year. The PDP is sponsored by the Engineering Institute of Canada, but local branches are diversified in their application of the program. Subjects range widely, with most attention given to the humanities. Speakers have been called in from the universities and from top management of corporations, some paid and some donating their time. While operation of the program involves some money, the Canadian experience indicates that this consideration ranks far down the list. Most important, the Canadians say, is the availability of enthusiastic and dedicated local leaders.

In neither country is there any shortage of enthusiasm among the men involved in the program. The present chairman of ECPD's Training Committee, John Gammel of Allis-Chalmers Manufacturing Co, feels that the need for professional development programs is becoming more pressing with every scientific advance. "Events in Russia as well as developments in our own research laboratories have provided strong scientific trends in American education. There will be increasing problems in getting a feedback of our science education and research discoveries into engineering. It is particularly important that industry as well as the young engineer understand this. They should take steps toward achieving it through continued development, particularly during the formative first five years out of school."

NOMINAL WEIGHTS OF FINISHED WEATHER-RESISTANT WIRE AND CABLE

(Pounds per 1000 Feet)

Conductor Size AWG or Mcm	Copper & Copper Alloy Conductors: URC Type Double Braid	URC Type Triple Braid	Neoprene Type	Polyethylene Type	Aluminum Conductors: Neoprene Type	Polyethylene Type
Stranded						
2	246	270	248	**230**	105	**87.4**
4	155	170	163	**143**	73.3	**53.3**
6	103	115	108	**91.5**	51.5	**35.0**
Solid						
2	239	260	232	**219**	92.2	**79.2**
4	151	164	152	**136**	64.0	**48.0**
6	100	112	101	**87**	45.7	**31.7**

Sources: American Standards Association Specifications

This table shows

POLYETHYLENE covered line wire weighs less

Because it's the lightest, polyethylene-covered line wire is the easiest for linemen to string up . . . hardest for ice and snow loading, gale-force winds to bring down.

Polyethylene-covered line wire, depending on size and conductor, weighs from 5% to 32% less than other types. That's what the figures in the specifications tabulated above show.

This, of course, is no news to linemen who have strung all types of weatherproof line wire. They may not be able to quote pounds and percentages, but they all know you can't beat polyethylene on weight.

Linemen's Favorite Material

Light weight means easy handling, one of the main reasons polyethylene rates tops with installation crews. They also like polyethylene wire because it's clean . . . free-stripping . . . has a smooth, self-lubricating surface that almost makes pulling a pleasure. And despite the exterior slip, the plastic covering hugs the conductor tightly, doesn't ruffle as it goes over crossarms.

"Built-in" Safety Factor

Polyethylene's lightness provides lasting mechanical advantages, since span loads don't tax supports as much as heavier type wire. This "built-in" weight safety factor pays off when violent storms push aerial construction to strain limits . . . when ice and snow loads topple heavier lines.

An added factor in polyethylene wire's ability to stay up under adverse conditions is its smaller diameter. It offers less resistance to wind, a smaller surface for ice build-up.

Winning Combination

Called the "closest to the ideal covering for line wire," polyethylene is outstanding in other respects too. The shield it forms over wire is continuous . . . tough . . . resistant to aging, weathering, moisture, abrasion by lashing branches. It's good for decades of superior service marked by fewer outages, minimum maintenance.

When you order covered wire and cable, make sure the coating is made with PETROTHENE® polyethylene resins. PETROTHENE polyethylene costs no more, but it gives you premium weather and stress-crack resistance.

Polyethylene's advantages are outlined in an informative new U.S.I. data sheet, "Polyethylene . . . The Best Line Wire Covering." Also available is a data sheet showing properties, applications and specifications of PETROTHENE polyethylene compounds. Send for your copies today.

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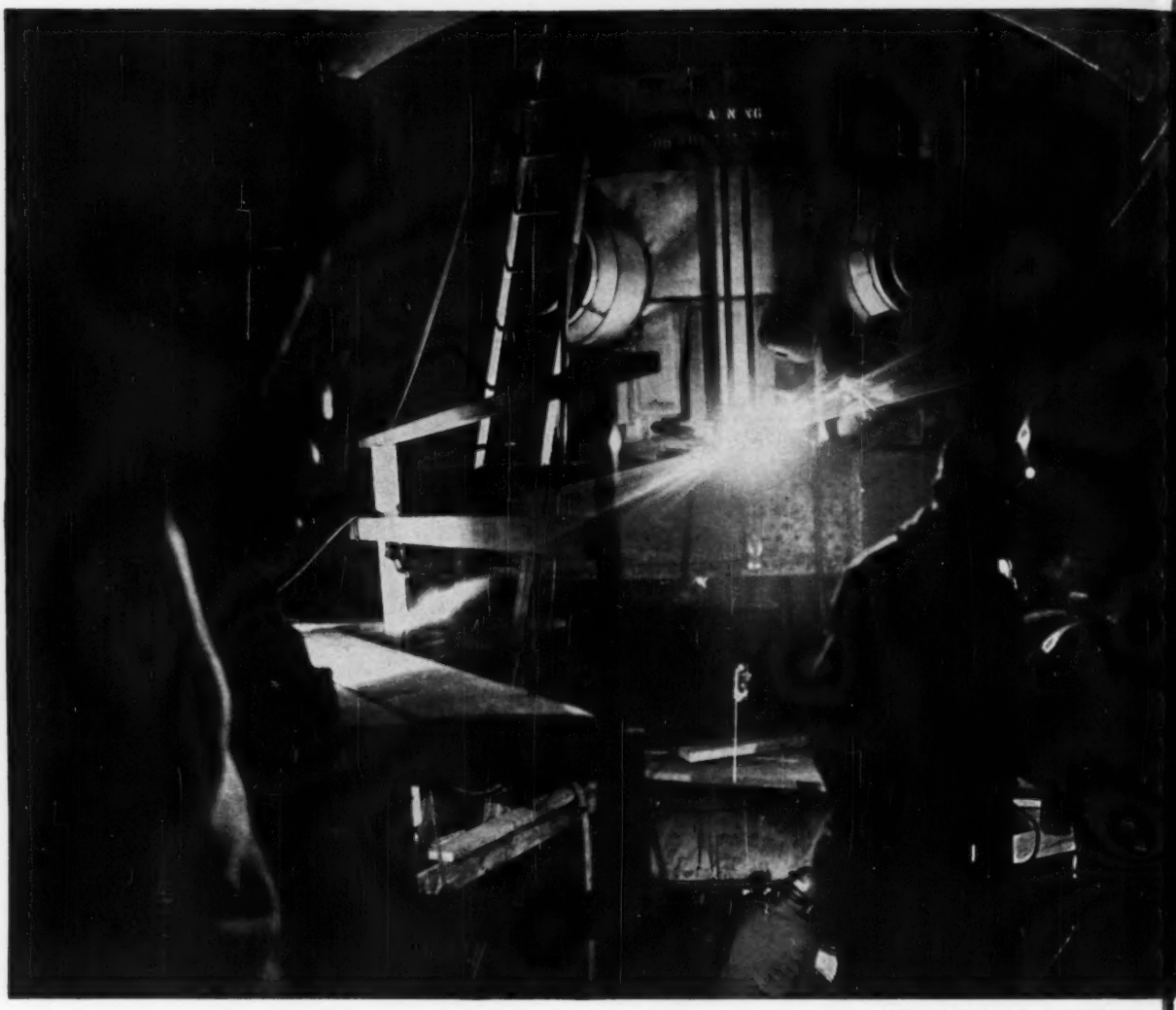


Photos by Robert Yarnall Richie

Rome's station control cable installed i

Artist's Sketch of first U. S. full-scale atomic-electric plant. This revolutionary power plant—under the operation of Duquesne Light Company of Pittsburgh—delivers electricity to home and industry in the Pittsburgh area.

Atomic-Electric Power is controlled from this large cabine installation at the Shippingport atomic power station. Nearly te miles of Rome's highest quality station control cable are used i this vital system.

Partner to the Atom. Rome's control cable is here being installed in the nation's first major atomic power plant at Shippingport, Pennsylvania. Rome Cable furnished over 50,000 feet of station control cable for this important installation.

d in Shippingport atomic power station

This country's first full-scale atomic power plant for the generation of electricity contains almost ten miles of Rome's station control cable.

The selection of Rome's Rozone-Roprene cable for this epoch-making installation was no accident, for individual Rozone-insulated, Roprene-jacketed conductors represent the ultimate in control cable design and performance.

Advantages of Rozone insulation. Rozone—a high-quality oil-base compound—is an excellent insulation. Long and widespread experience has proved that its high dielectric and impulse strength, combined with its resistance to corona and ozone cutting, makes it an ideal insulation for control and high-voltage power cables.

Advantages of Roprene jacket. Roprene—a neoprene synthetic rubber compound developed by Rome Cable—provides an extremely durable and permanent mechanical protective covering for the individually Rozone-insulated conductors. It assures terminations that are resistant to abrasion, weather, and attack by chemicals and oils. And it is exceptionally resistant to fire.

ROME CABLE
CORPORATION

Specify premium-quality Rozone-Roprene control cable for your next job. Contact your nearest Rome Cable salesman for more information.

MEET THE MAN
WHO'S DEDICATED TO **YOUR** JOB
YOUR ROME CABLE SALESMAN

ROME CABLE
DIVISION OF **ALCOA**
Department 1-11, Rome, N.Y.

☐ Please send me more information on the above.
☐ I want to "Meet The Man" who can tell me more.

Name .....
Title .....
Company .....
Street .....
City ..... Zone ..... State .....

Ward Elected President of Commonwealth Ed

J. Harris Ward has been elected president of Commonwealth Edison Co, succeeding John W. Evers who retired October 31. Ward formerly held the post of executive vice president which will be discontinued.

Ward, 51, joined Commonwealth Edison in 1938 as an investment analyst. He was elected secretary of the company in 1948, vice president in 1951, vice president and treasurer in 1952, and executive vice president in 1955. He has been a director since 1957.

Under the utility's executive rotation policy, Ward has served as financial vice president, vice president in charge of commercial activities, and has been in charge of operating, engineering and construction activities.

Before joining Commonwealth Edison, he worked for the National Recovery Administration, and Brown Bros. Harriman & Co, New York.

Evers' retirement comes after 46 years of service with the utility. He was elected assistant treasurer in 1922, and, after other positions, became executive vice president in 1951 and president in 1953.

Idaho Power Names Bailey Head of Division Operations

D. S. Bailey has been elected a vice president of Idaho Power Co. Recently named to the new post of manager of division operations, he will coordinate the activities of IPC's four divisions.

Bailey joined Idaho Power as an apprentice engineer in 1929 after being graduated from the University of Idaho with an electrical engineering degree.

He was assistant southern division sales manager and sales manager at Twin Falls before becoming southern division manager there in 1954. He came to Idaho Power's general office in September of this year.

The Twin Falls Junior Chamber of Commerce presented Bailey the "Senior Citizen Distinguished Service Award" in 1952. He is a past president of the city's Chamber of Commerce.

Memco Ups Williams, Wilson to Top Executive Posts

Edwin A. Williams has been elected president and chief executive officer of Memco Engineering & Manufacturing Co, Inc. Robert J. Wilson has been made vice president, finance and sales.

Williams succeeds Joel S. Lawson, who recently retired from active work but will continue as consultant.

Williams has been executive vice president at Memco since 1956.

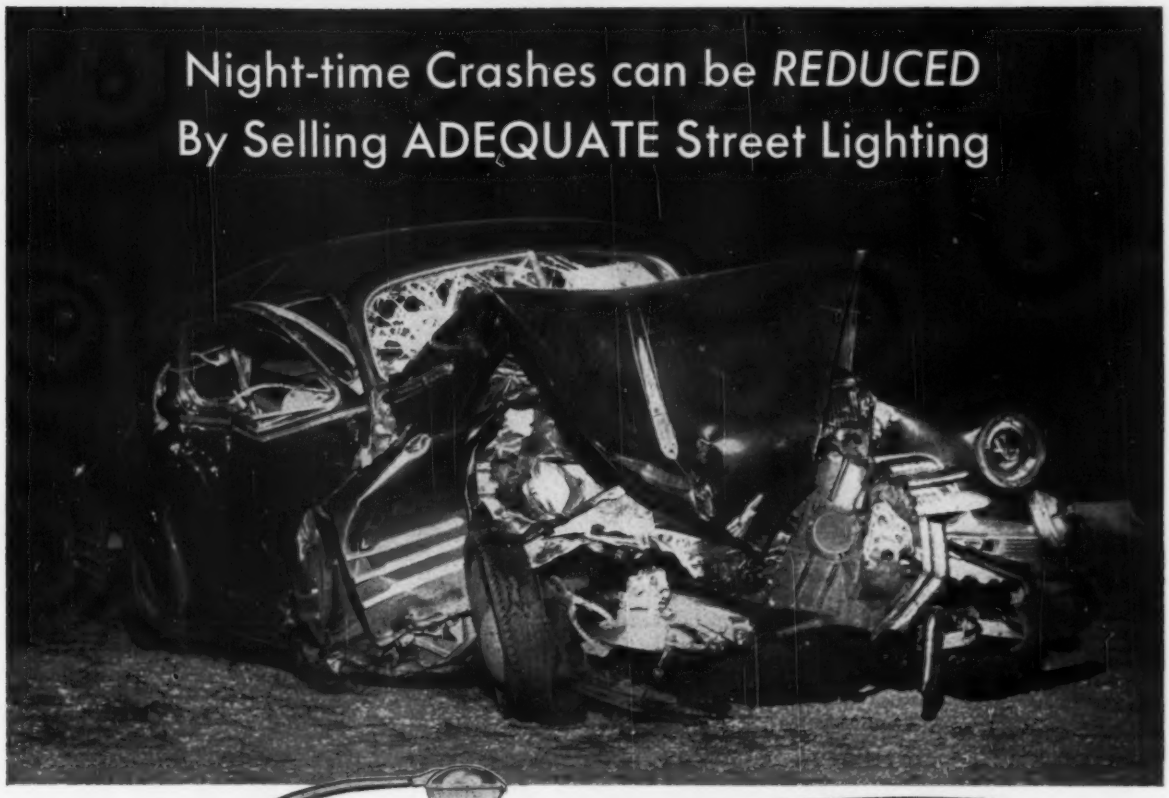
Wilson, a CPA, joined Memco as comptroller in 1952. He became treasurer and general manager in 1955.

(*More News About People on p* 130)

WILLIAMS

WILSON

Night-time Crashes can be *REDUCED* By Selling ADEQUATE Street Lighting



In surveys by authoritative agencies it is shown more than 21,000 of the nearly 40,000 persons killed in traffic accidents last year were in night-time crashes. Besides this, 750,000 persons sustained disabling injuries.

We all can help reduce this slaughter by promoting and selling adequate street lighting programs. To assist you our new catalog is available. It contains engineering data on the very latest in steel and aluminum lighting standards, traffic signal standards, overhead sign structures, mast arms and brackets. Samples and success stories on city and town relighting programs are also available. Just write us now.

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NEW from KERRIGAN — THE CLASSIC Pat. Pending

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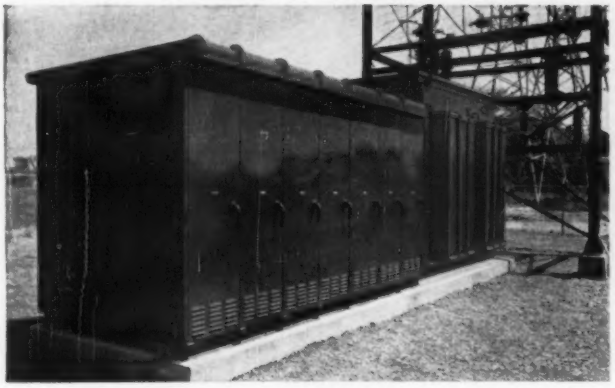
KERRIGAN
IRON WORKS COMPANY
Nashville, Tennessee

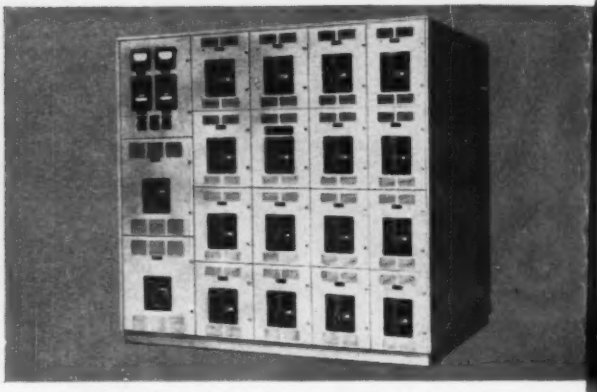
For better lighted streets and highways the STANDARD is KERRIGAN!

I-T-E CIRCUIT BREAKER COMPANY

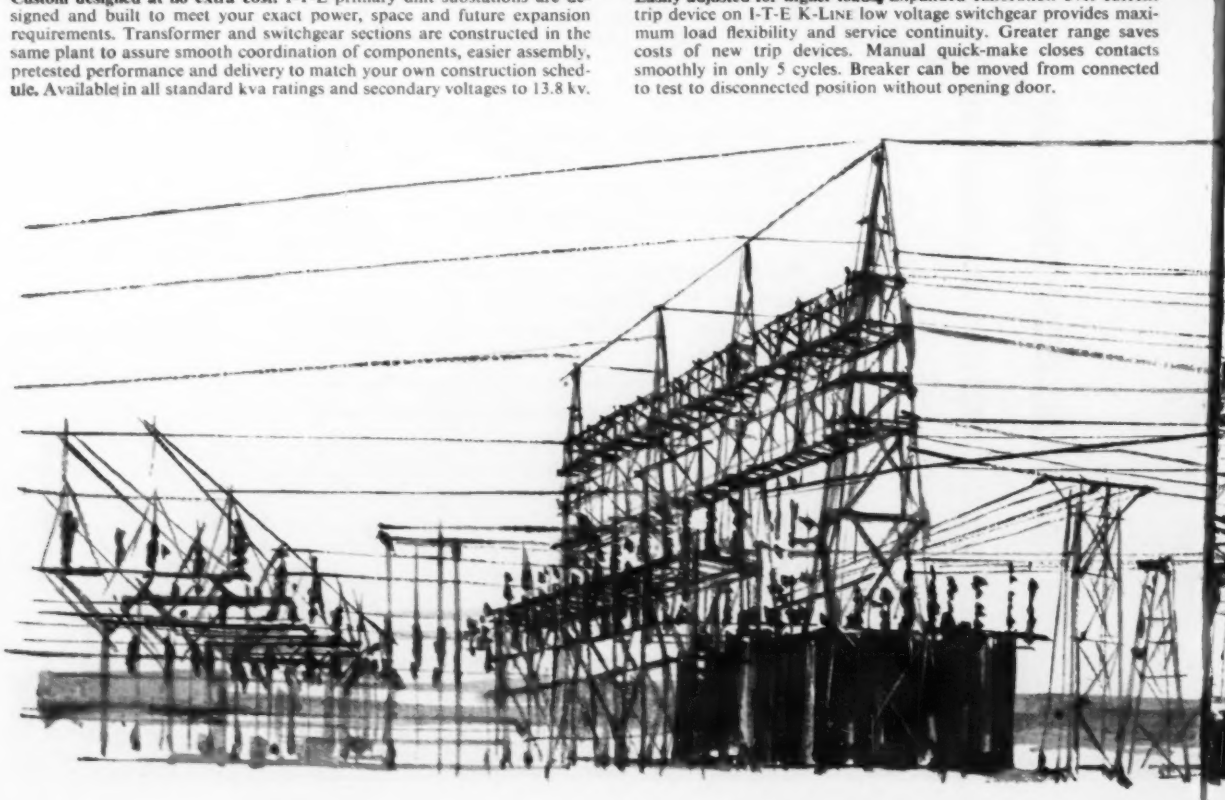
EFFICIENT



Custom designed at no extra cost. I-T-E primary unit substations are designed and built to meet your exact power, space and future expansion requirements. Transformer and switchgear sections are constructed in the same plant to assure smooth coordination of components, easier assembly, pretested performance and delivery to match your own construction schedule. Available in all standard kva ratings and secondary voltages to 13.8 kv.



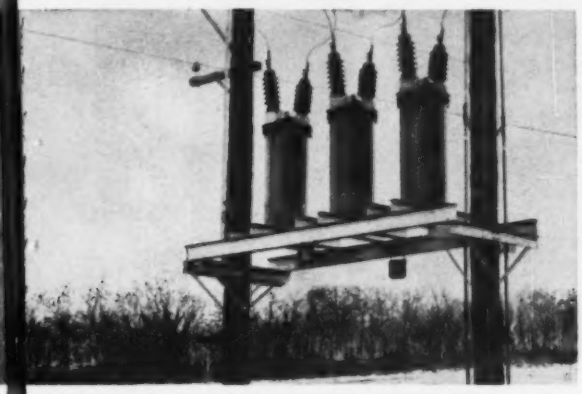
Easily adjusted for higher loads. Expanded calibration over-current trip device on I-T-E K-LINE low voltage switchgear provides maximum load flexibility and service continuity. Greater range saves costs of new trip devices. Manual quick-make closes contacts smoothly in only 5 cycles. Breaker can be moved from connected to test to disconnected position without opening door.



At I-T-E, substation structures are designed and fabricated in the same plant . . . under one responsibility. Once the single-line diagram has been prepared, engineering and manufacturing personnel closely coordinate every step of substation production—from preparation of layout drawings and application of blade switching equipment to the finished and carefully identified structural parts. You benefit from a more efficient design, more efficient use of materials, and virtually rework-free assembly at the installation site.

I-T-E's unified substation service has been meeting the needs of utilities for almost half a century. During this time it has delivered over 100 million pounds of steel substation components. And in 1947 I-T-E solved the problem of excessive maintenance due to corrosive atmospheres by producing the first all-aluminum substation.

The efficient planning and original thinking which are embodied in I-T-E substations are typical of the extra care—extra quality—found in all I-T-E products. Utility men know this from day-to-day experience with I-T-E equipment. And comparing prices shows that I-T-E quality costs no more.



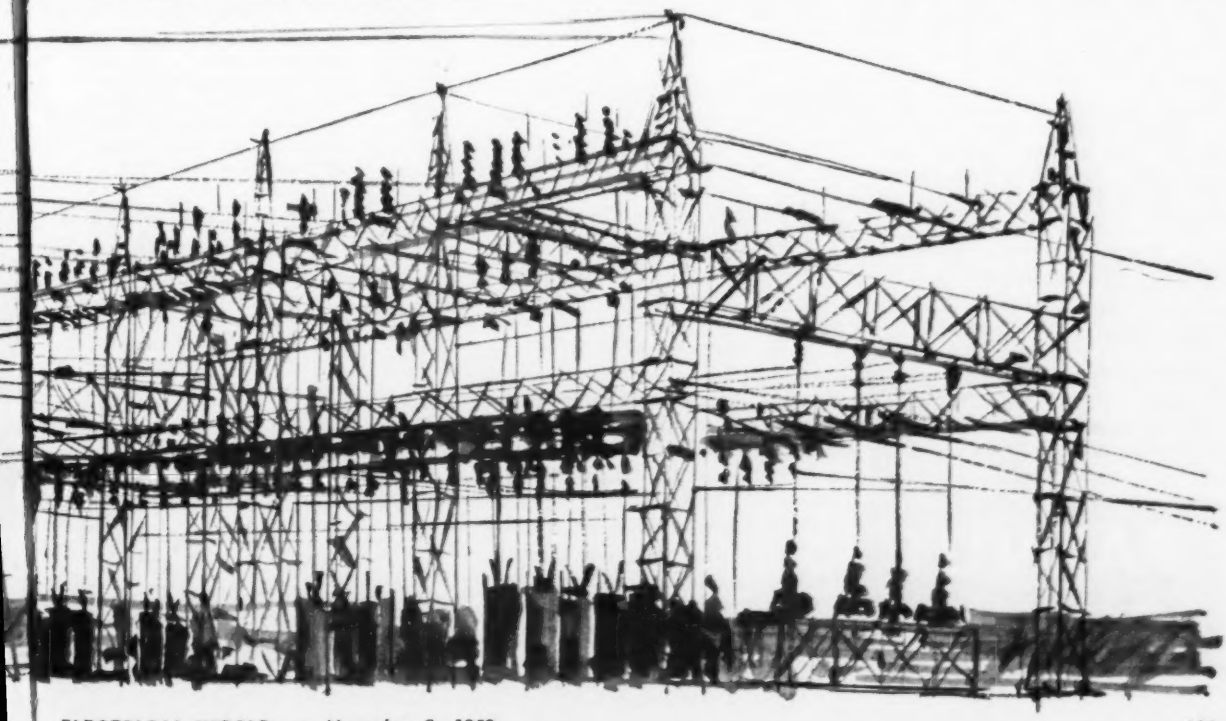
Fastest transient fault protection. I-T-E automatic circuit reclosers improve continuity of service . . . reduce lost revenue from outages. Faults are interrupted within 1½ cycles. Inverse time characteristics coordinate with fuses and protective relays to isolate persistent faults. No auxiliary power supply or control relaying is required. For 2.4 through 46 kv service, up to 400 amperes continuous.

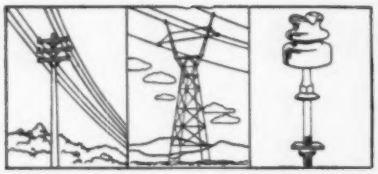
I-T-E Circuit Breaker Company U-2
1900 Hamilton St., Philadelphia 30, Pa.

- ☐ Outdoor substation structures
- ☐ Primary unit substations
- ☐ K-Line LV switchgear (600 v)
- ☐ Automatic circuit reclosers
- ☐ Outdoor air switches
- ☐ Load interrupter switches
- ☐ Distribution cutouts
- ☐ Metal-clad switchgear (4.16 and 13.8 kv)
- ☐ Other _____

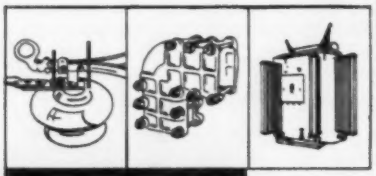
Name _____ Title _____
Company _____
Street _____
City _____ Zone ____ State _____

SEND COUPON Get full details on specific I-T-E equipment. And remember I-T-E engineering assistance is always at your disposal.





Keep Nuts Tight
on all bolted assemblies



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LOCK NUTS

PALNUT Lock Nuts apply so fast, lock so dependably . . . you can specify them for every nut-and-bolt assembly, at negligible cost. Maintenance is reduced on mechanical assemblies—full conductivity assured on electrical connections.

PALNUT Lock Nuts may be used on new or existing equipment. Easily removed and re-used when servicing. Require only 3 bolt threads. Available in plain, Parkerized and hot dip galvanized steel; also silicon bronze.

Send for free samples, stating size and application

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51 Glen Road
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PALNUT
TRADE MARK
LOCK NUTS
for quick, secure fastening at low cost

Hamburger Named Sales Manager at Copperweld

George Hamburger (photo above) has been named sales manager of the Wire and Cable Division, Copperweld Steel Co. R. C. Ridley has been made assistant to the vice president.

Hamburger was formerly manager of communication and government sales for the division. Prior to that he was manager of the St. Louis district.

Ridley has been with Copperweld since 1935 and was most recently assistant manager of sales.

PERSONAL BRIEFS

W. C. McGuire has been advanced to industrial development engineer for Public Service Co of Oklahoma.

American Institute of Electrical Engineers elevated the following members to the grade of Fellow: **Henry A. Clarke,** superintendent, system station department, Appalachian Power Co, "for contribution to carrier current relaying and ultra high-speed power circuit reclosing techniques.". . . **Joseph W. Graff,** chief electrical engineer, Alabama Power Co, "for contributions to power system planning.". . . **Max H. Kight** chief of the electrical branch, Department of the Interior, Bureau of Reclamation, Denver, Colo., "for contributions to the establishment of large-scale hydro plants and associated power transmission.". . . **Melvin G. Lewis,** executive engineer, Bechtel Corp, San Francisco, "for contributions to the design and construction of large electric plants.

(*Continued on page* 132)

1ST CHOICE of UTILITY COMPANIES!

HKP® PORTER
COHARDITE INSULATED ELECTRIC WIRE **CUTTER**

For Fastest Safest • Surest Live Wire Cutting!

• Made with utility men in mind! • Cuts insulated wire soft or medium hard, solid copper wire and medium hard steel wire up to ½"! • Rugged, durable handles, Cohardite insulated • Factory-tested to 20,000 volts! Also available with round edge jaws for harder wire.

The TN STEEL CABLE CUTTER

For Steel Cable & Wire Rope
Shear-action cutter — cuts all soft or hard steel cable and wire rope up to ¾"! No deforming of wire — notched jaws lock cable during cut! Cuts fine or course stranded cable easily and cleanly.

2 CN SPECIAL SHEAR CABLE CUTTER

For Copper and Aluminum Cable
Cuts soft, non-steel cables, insulated or not, up to 1⅜"! O.D. Jaws pass each other for clean cutting! A "must" for every company using Copper or Aluminum Cable. Not recommended for ACSR.

Order from your supply house or write direct for free **PORTER CATALOG** *— Showing many other tools for utility companies.*

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H. K. PORTER, Inc.
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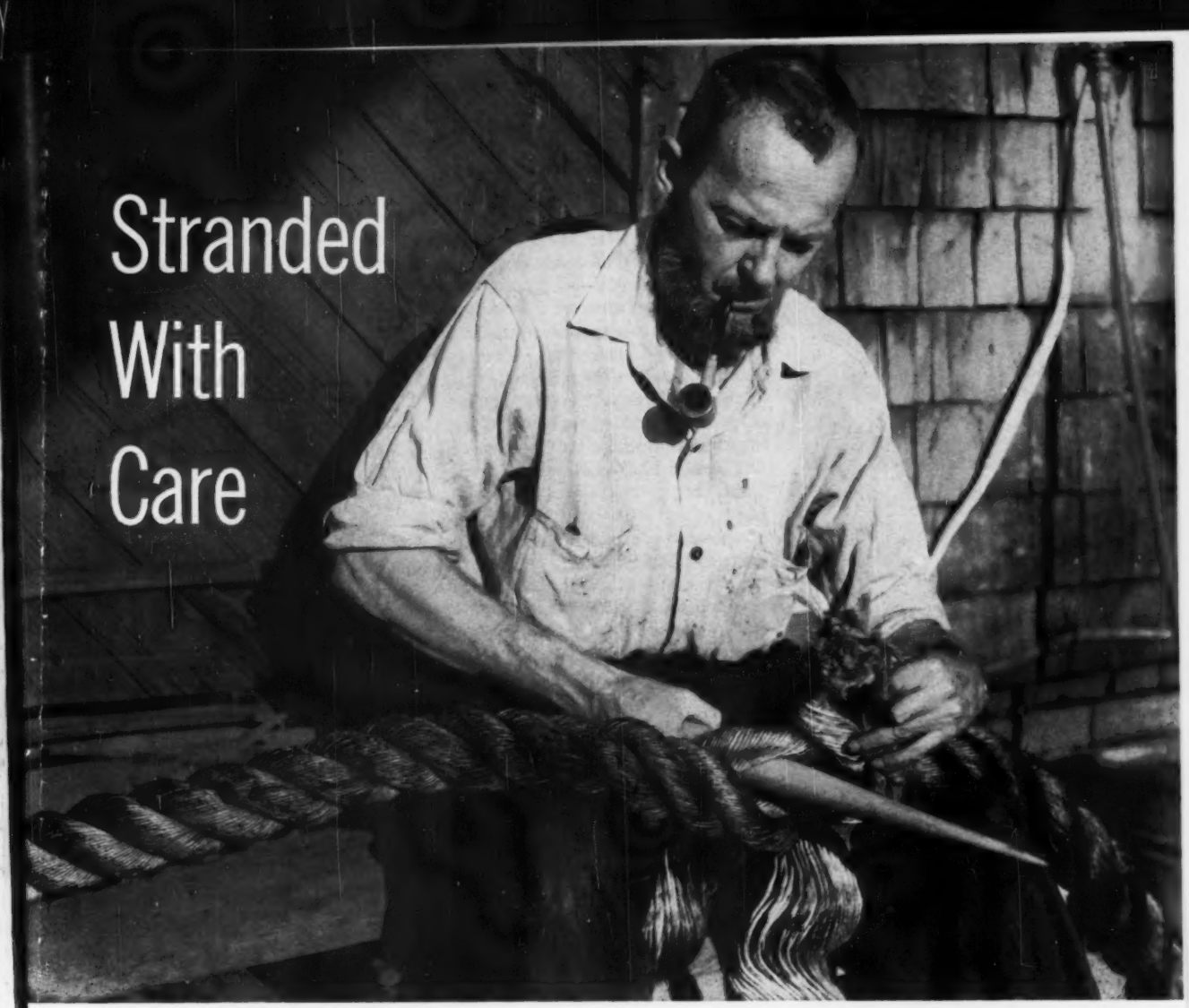

• Southwire Galvanized Steel Strand

STRAND SIZE	5/8"	1/2"	7/16"	3/8"	5/16"	9/32"	1/4"	3/16"
WEIGHT PER 1000'	813 lb.	517 lb.	399 lb.	273 lb.	205 lb.	164 lb.	121 lb.	72.9 lb.
MINIMUM BREAKING STRENGTH IN POUNDS								
ASTM A-122-54T								
Galvanized (Single Galv.) Common	11600	7400	5700	4250	3200		1900	1150
Class A (Double Galv.) Common	11600	7400	5700	4250	3200		1900	1150
Class A (Double Galv.) Siemens-Martin	19100	12100	9350	6950	5350	4250	3150	1900
Class A (Double Galv.) High Strength	29600	18800	14500	10800	8000	6400	4750	2850
Class A (Double Galv.) Extra High-Strength		26900	20800	15400	11200	8950	6650	3990
Class A Utilities Grade, A.T.&T. and Western Union Spec.—7-wires		25000	18000	11500	6000*	4600		2400**
ASTM A-363-55T (No welds)								
Weldless High-Strength		18800	14500	10800	8000			
Weldless Extra High Strength		26900	20800	15400	11200			

*weight per 1000'—225 lbs. **weight per 1000'—80.3 lbs.

The infinite patience and skill used by the seafarer in stranding or splicing rope is matched by modern machines at Southwire.

Southwire Galvanized Steel Strand is manufactured to meet or exceed applicable ASTM specifications . . . and preformed to eliminate flared ends when sheared. Quality is our first concern, including premium-quality non-returnable reels on all reel shipments. Available in 250', *500' and 1,000' coils, 2,500', *5,000', 5,280' reels. Feel free to inquire about special packaging to suit your particular requirements.

Specify Southwire Galvanized Steel Strand for ground, messenger and guying applications, *shipped by our own fast fleet of trucks direct to your warehouse or jobsite.*

*Stock items

Southwire Company

Carrollton, Georgia—TErrace 2-6311

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- Neoprene, Polyethylene, and VWP (Vinyl) Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Galvanized Steel Guy Strand and Static Wire
- Aluminized Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
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and installations." . . . **Arthur M. Lockie,** advisory engineer in charge of long-range major development for the distribution transformer department, Westinghouse Electric Corp, Sharon, Pa., "for contributions to the thermal analysis of performance and life of loaded distribution transformers." . . . **Albert J. Maslin,** manager, substation and tap changer engineering, Westinghouse Electric Corp, Sharon, Pa., "for contributions to development of power transformers, particularly for use with mercury arc rectifiers." . . . **Martin H. McGrath,** vice president and chief engineer, General Cable Corp, "for contributions to progressive development of high-voltage power cables, particularly the pipe-enclosed gas pressure type." . . . **Adolph H. Mergenthaler,** chief design engineer, Southern Services, Inc, "for contributions to planning of economic power system generating capacity." . . . **Philip Ryan,** president, Cutler-Hammer, Inc, "for contributions to creation and production of electrical controls." . . . **Herbert D. Short,** chief engineer, high-voltage engineering department, Canada Wire & Cable Co, "for contributions to the design and installation of high-voltage power cables of large capacity." . . . **William A. Sumner,** advisory engineer, long range development for distribution transformer department, Westinghouse Electric Corp, Sharon, Pa., "for contributions to design of self-protective distribution transformers and to use of gain oriented sheet steel transformer cores." . . . **Kimball L. Wheeler,** manager, plant and substation engineering department, Cleveland Electric Illuminating Co, "for contributions to the development of large power systems and the rehabilitation of power systems in Korea."

John C. Turpin becomes assistant head, Real Estate and Rights-of-Way Division, engineering department, Dallas Power & Light Co.

Pres **Walker Cisler** of Detroit Edison Co named special consultant to the defense department to assist in a review of organization and management of missile test ranges and satellite tracking facilities for both the Pentagon and National Aeronautics and Space Administration.

Electrical League of New York, Inc, named **Don E. Rosenthal** as executive director.

John P. Casserly is the new general sales manager of the Automotive Division of the Electric Storage Co.

Rear Admiral Kenneth Adams, RCN (ret), has become the manager of the Pacific district of Canadian Westinghouse Electric Corp.

General Electric Co has made these recent personnel changes. **George B. Cox** has been appointed manager-sales, region four, for the large steam turbine-generator department. **Lee H. Hill, Jr,** has been made manager of sales for the company's service shops department. **John L. Managan** has become manager-marketing research, product, and sales planning and **John J. O'Hara** named manager-industry sales for the company's gas turbine department.

John T. Stiefel, manager of the surface ship project for Westinghouse Electric Corp at the Bettis atomic power laboratory, has been awarded the company's Order of Merit, the highest award that can be given to an employee.

Harvey Nichols made assistant residential and rural sales manager of the Arkansas Power & Light Co.

Newman C. Stirewalt, vice president and purchasing and stores agent for Central Illinois Public Service Co, will retire on Oct. 31.

LeRoy R. Patterson, has been elected to the board of Public Service Co of Colorado, succeeding **Marshall M. Koch,** executive vice president, who retired on Oct. 1.

Re-election of **J. C. Moller, Jr,** to a fourth term as president of the Los Angeles Board of Water & Power Commissioners was announced recently.

Ebasco Services, Inc, has appointed **A. W. Peabody** supervising engineer of the corrosion engineering group.

Association of Power Biologists has been formed recently by electric utilities in the states of Oregon,

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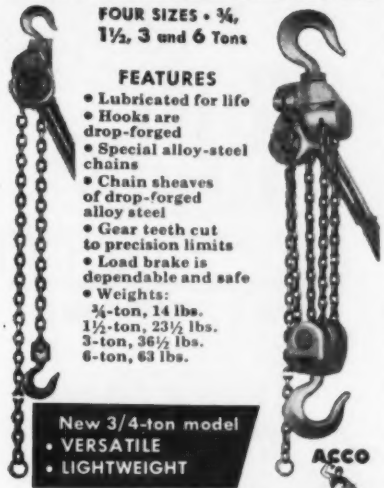

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Washington, California, Wyoming, Idaho, and Montana. The president is **George Eicher** of the Portland General Electric Co.

British Columbia Power Commission has made these recent personnel changes: **R. C. McMordie,** acting general manager and chief engineer, becomes manager of engineering and operations and chairman of the commission's senior staff executive committee. **I. R. A. Mills** becomes controller. **Garth Griffiths** assumes larger responsibilities as the commission's principal administrative officer, and will direct the activities of the power districts, legal, personnel, load development, information, and secretarial divisions.

Lon C. Hill named honorary chairman of the Central Power & Light Co board, stepping down from the active chairmanship he has held since 1954.

Ralph W. Lawlor, assistant treasurer of the Pacific Power & Light Co, has retired.

Gerard A. Weiss has been appointed treasurer of the Rome Cable Division of Aluminum Co of America.

R. Martin Galvin has accepted a post as secretary of the Public Utilities Commission of Ohio.

Northwest Electric Heat Assn has been formed with **Ken Crow,** power use consultant for Grant County (Wash.) PUD, as president. **Cecil Penny,** commercial manager of Clark County PUD, is treasurer. The group will encompass the seven western states.

H. Atwood Hitch, vice president of Virginia Electric & Power Co, has been named president of Public Utilities Assn of the Virginias.

Charles E. Hoefler has been made the Better Light Better Sight Bureau's assistant manager.

Vern B. Lewis, assistant manager for administration for the Atomic Energy Commission's Hanford operations office, Richland, Wash., has accepted a temporary assignment with the Brookings Institution in Washington, D. C.

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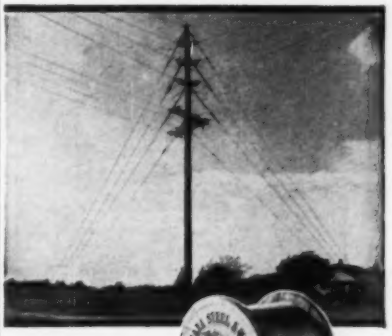

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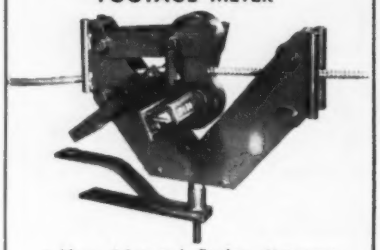

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OBITUARY

Annett, Former Editor of Power, Dies

Fred Annett, former senior associate editor of Power magazine, died recently. First associated with the magazine when he sold subscriptions, he joined the editorial staff in 1916 as associate editor.

During his 35 years with Power, Annett wrote the "Electrical Study Course" which was turned into the book, "Electrical Machinery."

T. E. Mansfield, 58, assistant chief engineer for Central Power & Light Co . . . **Edward W. Gardiner,** Duquesne Light Co, former superintendent of Elrama Power Station . . . **George T. Manley, Sr.,** 63, attorney and former credit manager for Georgia Power Co . . . **Farris B. Stimson,** 64, manager of the Bloomington, Ind., district office of Public Service Co of Indiana.

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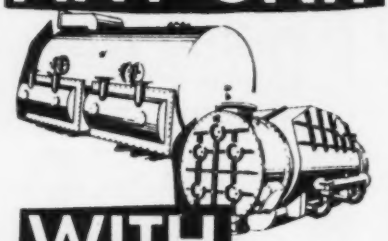

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SALES ASSIGNMENTS

COMPANY STAFFS

Hotpoint Co has made these recent sales assignments. Fred C. Teich, Jr, midwest zone manager located in Cincinnati, has been promoted to manage the Chicago metropolitan area, replacing Leonard Barabas, resigned. Joe Mathis takes over Teich's former zone. Horace Garrett, commercial zone manager for Georgia, has moved up to the Home Appliance Division and is now representing the sales department in its southern district. Charles E. Pace has been named Garrett's replacement. Bill Kennedy, formerly commercial sales specialist with Houston Lighting & Power Co, has been appointed to represent Hotpoint in southern Texas.

Allis-Chalmers Manufacturing Co has appointed Jesse W. Bowen, Jr, and David H. Weiss as sales representatives in the Boston district and Washington office, respectively.

Electric Storage Battery Co has named William Duncan sales manager, original equipment manufacturers, Automotive Division. Charles E. Justice has become sales manager, private brands, Automotive Division.

Westinghouse Electric Corp has formed a new product distribution center in Seattle, Wash., under Harry R. Beyers as manager. Center will serve as district headquarters and warehouse for both Westinghouse appliance sales and lamp division products.

Clark Controller Co has made these personnel changes: Martin M. Holt and Joseph M. Burke to application engineers for the New York District sales office at 60 East 42nd St, N. Y. 17.

Westinghouse Electric Supply Co has appointed A. Dwight Lynch, national sales manager, specialty products.

Kaiser Aluminum & Chemical Corp has made R. J. Harrison, division market sales manager; E. K. Matteson, manager of utility sales; J. G. Johnson, manager of industrial sales; J. A. Leuver, north central regional manager, and R. L. Keummerlein, Kansas City regional manager. The division will now be located in Oakland, Calif.

REPRESENTATIVES

Clark Controller Co has appointed Hardin Sales Co, 512 15th St, Rock Island, Ill., as a distributor to handle Clark's line of standard electrical controls.

Westinghouse Electric Corp has named Newark Electric Co, Chicago, Ill., as the first warehousing distributor for semiconductor products. Newark Electric will stock the complete line of Westinghouse silicon rectifiers rated from ½ to 240 amperes and the new Westinghouse silicon transistors (2N1015 and 2N1016).

Allis-Chalmers Mfg Co has named these sales representatives for the Industries Group offices in the East: Walter E. Blankley, Philadelphia; Gerard F. Moran, Rochester; and John J. Nolan, Boston. James McInnis, Jr., has been made a sales representative in the Mobile district; Roy E. Goodwill, Jr., manager, general product division sales, Central region; William R. Carlyon, manager, general industrial sales, Detroit district; Hugh S. Sells, manager, Boston district; Albert R. Knauss, Knoxville district manager. These appointments have been announced for the Cleveland district of Allis-Chalmers Industries Group: T. L. Dineen, manager, industrial sales, Roger W. Cavanaugh, manager, metals industry sales: W. F. Bueche, manager utility sales; and R. M. Morrow, supervisor, original equipment manufacturers and distributor sales.

Royal Electric Manufacturing Co has appointed Harry Wilson field representative in the southern Iowa territory. Howard J. McCrabb has been appointed field representative for eastern Kansas and all business in the state of Missouri, except for electrical contractors and industrials in St. Louis County.

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Two Approaches to Generation Planning

(*Continued from page 70*)

lectors. Use of Keck's process at Florida Power & Light has cut furnace and gas-pass cleaning time from many man-hr to 12-man-hr after a boiler has been removed from service.

H. A. Grabowski, Combustion Engineering, Inc, telling of current practice in water treatment for high pressure boilers, stated there is a serious need to establish the validity of the reaction mechanism of boiler steel and water.

Insulation levels in large power transformers can be reduced if capacitors are installed between the substation bus and ground to absorb traveling-wave-surge energy from transmission circuits, reported Herman B. Wolf, Duke Power Co. Tests conducted on the company's system show that such capacitor protection appears practical now because 50-kvar and 100-kvar units are available. Advantages of capacitor protection, as compared with arresters, are:

1. Instantaneous response to all surges regardless of wave shape or magnitude.

2. Protection is assured at all times because current flows continuously in the capacitor circuit and can be monitored or checked periodically.

3. Complete protection is provided by paralleling capacitors with back-up gaps that will spill a direct lightning stroke to the station or to a line in close proximity.

4. Capacitors are not damaged by switching surges, although they will not limit a long-wave voltage rise as effectively as the shorter lightning surges.

5. Cost of such protection is comparable with that of station-type arresters if credit is given to the capacitance applied to the system.

Capacitors Control Load Flow

Series capacitors can be a most attractive solution for controlling load division between parallel lines of widely differing conductivity, said H. L. Deloney and Jack Davey, both of Louisiana Power & Light Co. In one case, $500,000 spent for a series capacitor installation allowed a doubling of the effective loading of a $3 million transmission line. The additional transfer capacity gained cost $10 per kw, whereas the company's average transmission cost is $50 per kw.

W. A. Boone and Fred E. Rogers, both of Alabama Power Co, presented the design of the new 20.6-mile, 230-kv transmission line, about half of which will pass through rugged mountain terrain and cross high rocky ridges. Cost estimates for a waist-type, four-leg, light-weight steel tower were no greater than for other light-weight steel towers, and 18% greater than for wood structures. Steel towers were selected because of steel's high strength, lower maintenance costs, and difficult access tower locations.

Dual-Voltage Units Economical

Several years of use has convinced us that dual-voltage 2.4/7.2-kv transformers are economical and practical in converting to a higher distribution voltage, reported J. H. Gantt, South Carolina Electric & Gas Co. The little difference in total cost (unit, installation and cutover) as compared with use of conventional units is outweighed by a simple, fast cutover (less than half the time needed) which results in improved customer relations. This feeling was seconded by A. R. Perdue, Georgia Power Co, who said they apply dual-voltage units for any new installation in fringe areas scheduled for conservation.

An 11-unit fleet of portable 100-kva and 150-kva distribution transformers is proving most satisfactory during transformer replacements, said G. T. Finger, Duke Power Co. Each portable unit consists of a standard pole-type transformer mounted on a special carriage equipped with a metal hood which covers the wire reels and the transformer terminals. Four more single-phase units are being built; development of a 300-kva three-phase portable transformer has just been completed, he added.

Replacement of all bolted connections on subtransmission and heavy 15-kv feeders was begun last year, reported Robert L. Ware, Virginia Electric & Power Co. Replacement follows a study of the cause of an unusually high rate of failures in aluminum - aluminum, aluminum-copper, and copper-copper connections and a subsequent study of compression connectors and tools. All hot-line clamps attached directly to conductors are being replaced with compression-connected stirrups. Whereas hot-line clamps previously were used frequently to connect tap lines and as feeder opening points, now clamps are used only for transformer or arrester connections and recloser installations on small conductor lines. Continuing records show that elimination of bolted connections has reduced line outages materially, said Ware.

Aerial lift devices offer these advantages, said K. S. Field, Ebasco Services, Inc: Substantial economics in time and manpower; reduction in accident hazards; continued use of the skills of older lineman; and higher quality of work at mid-span locations or in tree trimming. Such aerial lift devices can be used effectively with one to three-man crews, although it is doubtful that a "rule of thumb" for determining crew size can be developed, said Field.

As feeder voltage and kva loading increase, regulators become more attractive than capacitors for voltage control because of the substantial decrease in cost per kva, said J. K. Dillard and R. F. Cook, both of Westinghouse, in discussing a digital computer analysis of capacitors and regulators. Also shown by the study was that at 7.2 kv to ground, a combination of fixed and switched capacitors and regulators is the most economical; at 2.4 kv to ground, fixed and switched capacitors only are most economical.

Light Stressed in Street Plan

A New Orleans engineering firm has come up with a plan for an elevated expressway above Canal St. in the city's business district.

If approved, the plan would find the street's two roadways widened to four lanes each and elevated to second-story level. The auto-less space below would be used by retail stores flanked by glass-enclosed air-conditioned sidewalks. Street lighting would come from a luminous ceiling over the walkways and by luminous sides. Waist-height fixtures would light the ⅞-mile long upper expressway.

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Electrical Superintendent Experienced in the Construction of power houses steam & Hydro, Industrial Plants, Substations, Transmission Lines, and Distribution Systems, Engineering background 25 years experience will relocate. PW-2953, Electrical World.

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Lighting Cuts Crime

(*Continued from page 53*)

Light & Power Vincent M. De Melto says the emphasis now is on modernizing lighting of the city's "fearways." One fearway, for example, was the dark area behind the city's Municipal Stadium. A few years ago, color-corrected mercury lamps were installed to floodlight the area, and crimes dropped immediately.

De Melto points out that the municipally owned light department has modernized 80% of its street lighting facilities. The civic support behind this program is typified by the local Federation of Women's Clubs which sent a committee to the mayor's office. The members said they weren't leaving until he told them exactly what he proposed to do about making Cleveland streets safe with adequate lighting.

ISLAND OF SAFETY: Street attacks drop in Cleveland where $20 light assemblies and call boxes are installed

Cleveland recently reactivated a program of installing "public emergency call boxes," which have proved of great help to police. The city will have installed 200 of the telephones in high crime areas by the first of the year. They have become "islands of safety," the police department says. In a 1-sq mile troublesome area, 24 call boxes were installed last year. Since then, not a single street attack has occurred.

Improvements such as these have convinced police officials that good street lighting pays. They share the utilityman's view that, with an annual crime bill estimated at over $10 billion, and a U. S. street lighting outlay of only $169 million per year, this crime-prevention tool should be in the forefront of community planning.

Next week, Electrical World explores other examples of how street lighting cuts crime, and how electric utilities are promoting lighting modernization on this front.

Sell Ideas Harder

(*Continued from page 74*)

tages of this design are: the unit is more accessible for maintenance; and more space is provided below the floor for piping and auxiliaries. Last-stage blades will be 46-in. long, the longest blades on any unit.

O. J. Stallkamp, Wisconsin Electric Power Co, said the unit will have a capacity of 275 Mw and will be the system's largest, double the size of the next largest on the system. Electrical features, described by N. A. Ricci, WEP Co, included connections to Blue Mound substation, where units 1 to 4 are connected, but without direct electrical connections to the station's Units 1 to 4. This separates Unit 5 electrically from adjacent units in the same station by at least 30 miles.

Lyle H. Kingston, Wisconsin Public Service Corp, was appointed chairman, Electric Operating Section, for the coming year, succeeding G. K. Hickman, Wisconsin Electric Power Co. W. H. Ferris Wisconsin Power & Light Co, was appointed vice chairman, Electric Operating Section, succeeding Kingston.

Glenn R. Black, Wisconsin Electric Power Co, was appointed chairman, Electric Sales Section, succeeding John H. McLean, Wisconsin Michigan Power Co. Earl Kissinger, Wisconsin Power & Light Co, is vice chairman, succeeding Black.

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The Importance of Balanced Compounding in Portable Cable Design

A portable cable is constantly under attack from many different directions. It is dragged over rough floor surfaces and rocky terrain, crushed under the wheels of trucks and carts, continually bent, flexed and stretched. In addition, it is very often subjected to attack by water, solvents, oil and ozone.

To give long, dependable service, portable cables must be able to withstand rough treatment, and must have built-in protection against all deteriorating factors. Moreover, they must possess other desirable qualities such as lightness and flexibility.

The science in designing these cables is to add the necessary ingredients in the jacket to provide maximum protection along with the maximum of other desirable features. This is where *Balanced Compounding* comes in. It is very easy to provide protection against one or two of the deteriorating factors, simply by loading the compound with an ingredient which is impervious or highly resistant to these factors. Unfortunately, however, the ingredients which provide resistance to abrasion or crushing may be highly susceptible to attack by oil or water; and vice versa.

The cable designer's problem, then, is to attain a balance in his compounding formula which will provide maximum protection against one deteriorating factor without reducing protection against others below the danger point.

To the buyer of cables, this means that *quantity* of any one ingredient is unimportant, unless it is considered in relation to the over-all ability of the cable jacket to resist *all* of the abuses to which it is subjected.

For balanced resistance to all these abuses, the best assurance you can get lies in the quality of the research and development facilities of the manufacturer, and the product's record of performance.

This is one reason why — in those industries where portable cables are continually used or purchased as components of a manufactured product — Simplex Tirex Cables are regarded as the standard.

Proof of the worth of Tirex *Balanced Compounding*, which gives balanced resistance to all the deteriorating factors of normal use, can be found in the fact that Tirex cables have been successfully performing under the most rugged operating conditions for periods ranging up to twenty years.

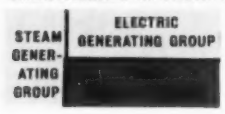
BALANCED COMPOUNDING CURED IN LEAD

Simplex

WIRE & CABLE COMPANY

Cambridge, Massachusetts and
Newington, New Hampshire

INNOVATIONS IN FLUID HANDLING: #3 OF A SERIES



As the manufacturer of all major components of the fluid handling group (pumps, condensers, deaerators, ejectors) Worthington has a reservoir of experience that can benefit you.

POTOMAC ELECTRIC POWER CO.
Dickerson Station, Units #1 & #2, 175 MW each

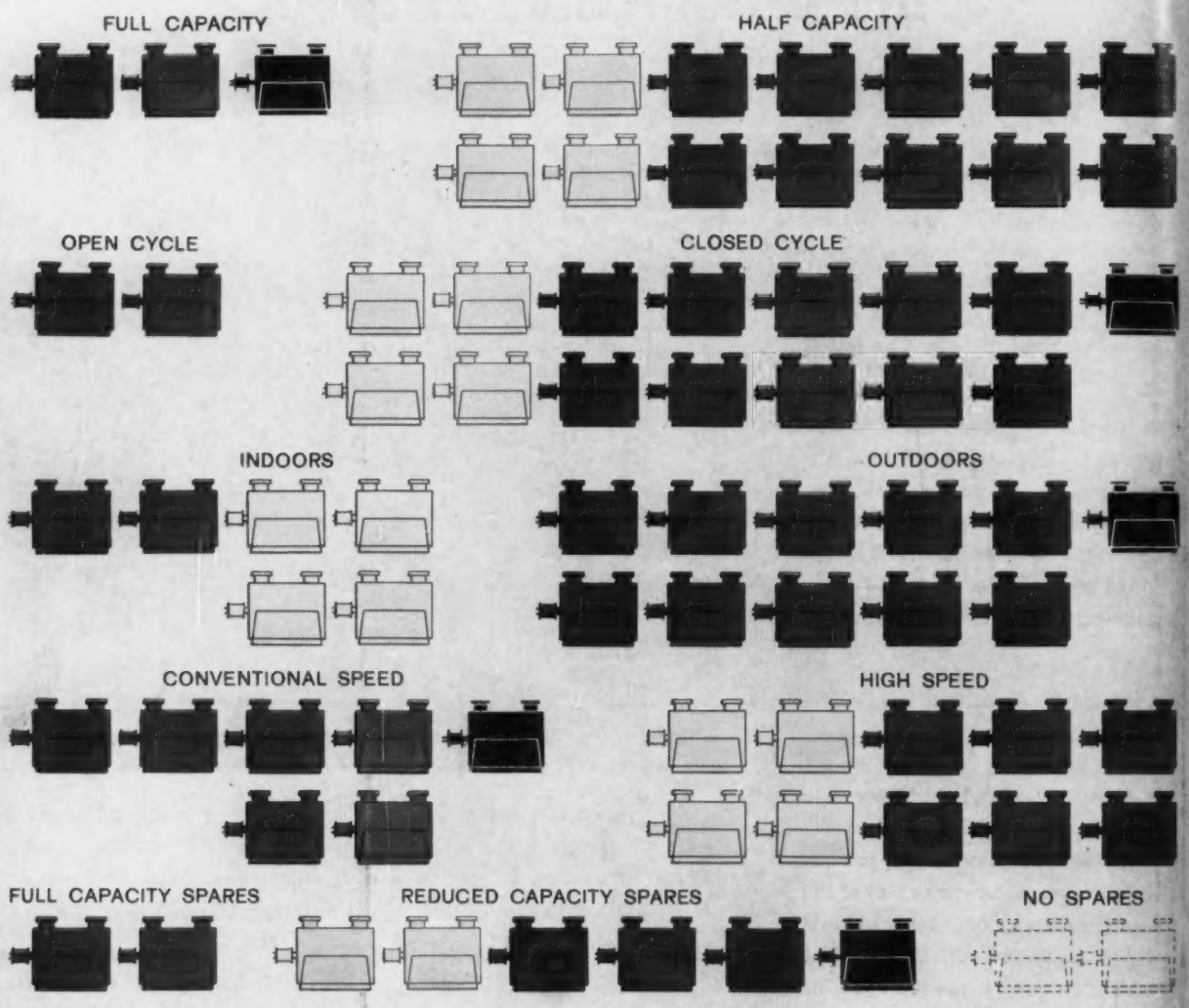
LOUISIANA POWER & LIGHT CO.
Little Gypsy Station, Unit #1, 230 MW

PUBLIC SERVICE ELECTRIC AND GAS CO. (N. J.)
Bergen Generating Station, Units #1 & #2, 290 MW each

PUBLIC SERVICE ELECTRIC AND GAS CO. (N. J.)
Mercer Generating Station, Units #1 & #2, 320 MW each

PACIFIC GAS & ELECTRIC CO.
Pittsburg Station, Units #5 & #6, 325 MW each

PUBLIC SERVICE ELECTRIC AND GAS CO. (N. J.)
Sewaren Generating Station, Unit #5, 342 MW



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MAIN DRIVE FEED PUMPS

Driving boiler feed pumps from the main generator shaft is a promising way of cutting power station costs. And Worthington feed pumps are being used to prove out this new idea.

Seventeen Worthington boiler feed pumps, main generator driven, are installed or will soon be installed. These 17 pumps plus their 8 spares will help to generate a total of 2,792,000 kilowatts in 10 separate installations.

Some of the characteristics of each of these pumps are shown. As you can see, there is a wide variety of applications. Some are indoor, some outdoor. Some for open cycle, some for closed. Some operate at conventional speeds of 3500 rpm, some at higher speeds. Some are half capacity pumps, others are full capacity. Some operate with full capacity spares, some with reduced capacity spares, others with no spares.

There is a good reason why most main generator driven pumps bear the Worthington nameplate. Whenever progress must be made, whenever the electric utility industry must forge ahead, more and more companies call on Worthington first . . . for pumps, condensers, deaerators and ejectors. Why don't you do the same?

For a copy of "Economics of Main Turbine Drives," write to Worthington Corporation, Section 45-11, Harrison, New Jersey. Ask for RP-931.

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